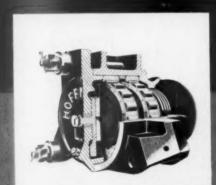
RAILWAY GAZIETTE

Price: Two Shillings

FRIDAY, JANUARY 6, 1961

Annually £5 by post

Power Plus...



A custively drawing of the "Chevron" type Asieties uses in conjunction with the modern method of Metalestik supposition, superseding the conventional laminated aprings HOFFMANN

parallei

AXLEBOXES

Way back in 1924 Hoffmann Roller Gearing Axleboxes first went into service. Since then demand has increased year after year. Now many thousands are to regular service fitted to all types of stack. Plany have been in use day in day out for over 20 years—cestimony to their efficiency and durability.

THE HOFFMANN MANUFACTURING CO. LTD., CHELMSFORD, ESSEX



Keeping pace with progress

WALKER'S

LION packings and jointings

James Walker & Co. can look back over seventy years of service to Britain's railways. But they prefer to look forward, to keep pace with—and often to anticipate—progress in the field of locomotion. Today, Walker's packings and jointings are used on railways throughout the world; and Walker's specialist experience proves invaluable to engineers engaged on railway modernisation schemes.

DIESEL!

"NEBAR"-Bonded cork jointing for oil and 'LION' JOINTS-For mudhole doors, etc. cooling water gaskets.

'TWILSTELE'-Woven steel and asbestos gaskets for extreme high temperature.

> 'METAFLEX'-Spiral edge - wound stainless steel and asbestos gaskets. UNILION'-General purpose joint-

STEAM!

'WALLICO' GAUGE GLASS RINGS

- Square, hexagon and cone sections.

'LION' EXPANDING - Steam packing for regulator valves.

'SUPASCA'-Packing for superheat steam valve service.

ing for oil and steam. WALKERITE'-Compressed asbestos fibre for all steam & water joints.



In special bonded cork for concrete, wooden and steel sleepers. Technical literature or information is available whatever your requirements.

The Seal of Supreme Service

LION WORKS . WOKING . SURREY . ENGLAND

Telegrams: "Lioncelle, Woking, Telex"

DEFOTS THROUGHOUT THE WORLD

A E I 25 kV Traction Equipment



FOR BRITISH RAILWAYS

One of 25—3,300 h.p., 25 kV locomotives on order for British Railways. A further 10 somewhat similar locomotives, together with 40 sets of electrical equipment for other locomotives being built by British Railways are also on order from AEI

The advice of AEI engineers, backed by over 60 years experience in electric traction, is available to assist you with all your needs from gears to complete railway installations. Please send your enquiries to your local AEI Office or direct to AEI Traction Division, Trafford Park, Manchester 17.



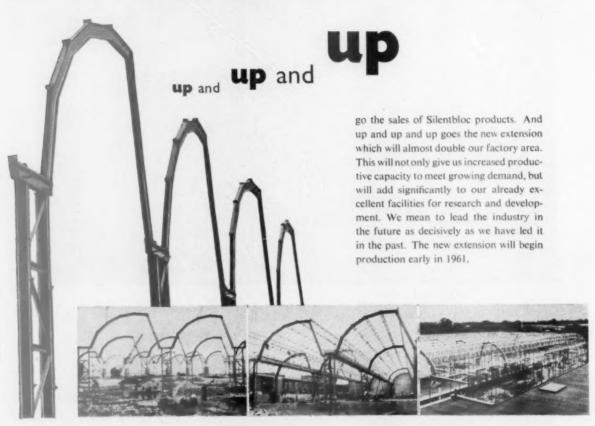
Associated Electrical Industries Ltd.

Traction Division

MANCHESTER · RUGBY · LONDON

KT/909







Come to us at the drawing board stage

SILENTBLOC

Anti-Vibration Devices
Flexible Bearings Mountings
Flexible Couplings Ball Joints
"Vibrex" Panel Fasteners
"Interlock" Locating Pins

"Flexsil" Couplings C.P.-Harris Shackles
Extensible Spindle Bands

SILENTBLOC LIMITED

MANOR ROYAL

CRAWLEY

SUSSEX

Telephone: Crawley 2100 Telegrams: Silentbloc Crawley

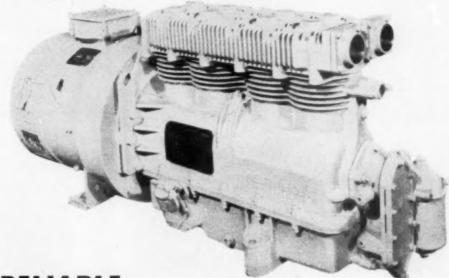
Exhausters by the thousand

Thousands of



'WESTEX' Exhausters

have been sold since their introduction in 1949



ROBUST

RELIABLE

· READILY MAINTAINED

Used in

GREAT BRITAIN · EIRE · SOUTH AFRICA RHODESIA · GHANA · NIGERIA INDIA · PORTUGAL · SPAIN ARGENTINE · BRAZIL · AUSTRALIA

For details write to:-

Westinghouse Brake and Signal Co. Ltd., 82, York Way, London, N.1

Westinghouse Brake (Australasia) Pty. Ltd., Saxby & Farmer (India) Private Ltd., Colcutta
Concord West, N.S.W.

Westinghouse Brake & Signal Co. S.A. (Pty.) Ltd.
Johannesburg. Agents-fieldamy and Lambie. Johannesburg.

EIGHTY YEARS OF AIR AND VACUUM BRAKE EXPERIENCE

DEPENDABLE

through
and
through



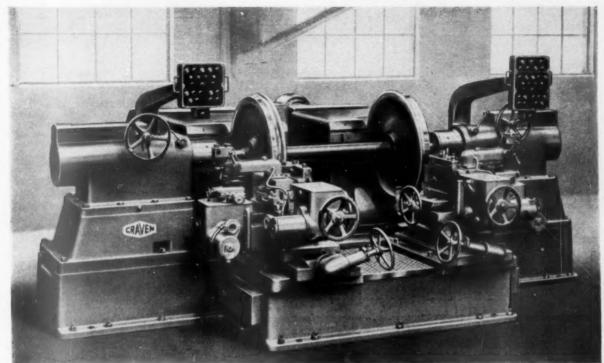
Birmingham Office and Stock 81 Headingley Road, Handsworth, Birmingham Tel: NORthern 8211

Tel: MONarch 8771-2

Manchester Office and Stock
177 Dickenson Road, Manchester 13
Tel: RUSholme 7313-4

Scottish Agent and Stockist
John Warden, 50 Wellington Street, Glasgow C.2.
Tel: City 6994 (2 lines) Grams: Precise, Glasgow





Floor-type Friction Roller Drive Wheel Lathe

FLOOR-TYPE AND PIT-TYPE

WHEEL LATHES

WITH FRICTION ROLLER DRIVE AND ELECTRICAL PROFILING

Recent developments in Craven Railway Wheel Lathes utilise carbide tools for re-turning diesel and electric traction wheels. The floor-type lathe deals with dismantled wheel sets, either with or without their axleboxes in position: the pit-type lathe re-turns wheel sets in position on the vehicle. The drive is by two pairs of hydraulically-loaded friction rollers—one pair to each wheel—giving a balanced, self-contained thrust upon the wheel rims to transmit a high driving torque without risk of distortion. Tread and flange form profiling is by Craven patent fully-automatic, single-point electrical profile copying equipment,

Patent Nos. 849291 & 833326, and application No. 29749/59.



CRAVEN BROTHERS

(MANCHESTER)

LTD

VAUXHALL WORKS . REDDISH . STOCKPORT . ENGLAND

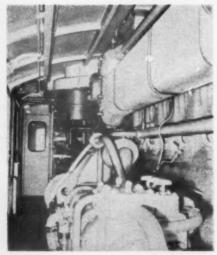


A 450 ton load at 70km/h!

Thailand's narrow railway gauge (1 metre) called for special consideration in the design of 950 H.P. diesel-electric locomotives for her State Railways. Maximum permissible axle load was 12 tons, and the restricted body width entailed a special arrangement of mechanical and other parts.

The hot humid climate under which the locomotives would operate required particular attention to be paid to the cooling system, and to the electrical insulation. Then there were the operator's requirements—450 ton loads at 70 km/h on level runs; 400 tons at 12 km/h on grades of 25 per mil.

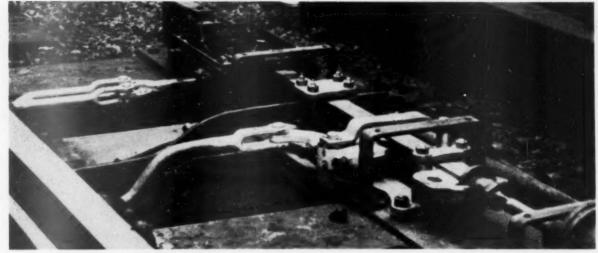
Hitachi built them. Hitachi has the know-how, having built one of the world's largest narrow-gauge diesel-electric locomotives (1,900 H.P.) and several 1,400 H.P. units for the Japanese National Railways. 5 units have already been delivered to Thailand and 25 more are being built in Hitachi factories, whose experience will keep them rolling for many years to come.





Cable Address : "HITACHY" TOKYO

*DU



gives 20 times the life -without lubricαtion!





ABOVE: Standard lubricated assembly with 1" dia. mild steel pin and hardened steel bushes, after three months operation.

BELOW: Anodised aluminium alloy pin 1° dia. from Glacier dry bearing assembly after three months operation. Dark area on pin is P.T.F.E. lead substance and indicates satisfactory operation.



This remarkable result from a long series of rigorous tests on Glacier DU dry bearings and bushes makes possible tremendous savings in material and maintenance costs.

The testing ground was a busy junction at Euston Station. DU dry bushes, running unlubricated against anodised aluminium pins, were used in the assemblies of point mechanisms that operated 300 times a day. After several months, including spells of very severe weather, inspection showed no measurable signs of wear. Operating life was estimated at twenty times that of conventional bushes and pins.

Glacier DU has these very considerable advantages.

Fretting corrosion, the principal cause of wear in such cases, is completely eliminated. With DU it CANNOT OCCUR. Extreme weather conditions do not affect DU bearings, and lubrication is never necessary.

*Glacier DU dry bearings are composed of steel strip to which is sintered a layer of porous bronze impregnated with a mixture of a fluoro-carbon plastic (P.T.F.E.) and lead.

Glacier DU dry bearings and bushes have also been tested and proven in these varied applications:-for detector boxes, train stops, upper quadrant assemblies, brake mechanism assemblies, bolster swing link assemblies and locomotive LT tap changer mechanisms, thrust screw adjustment assemblies and motor bogie axle boxes.

GLACIER

For details of the range and properties of Glacier dry bearings, write for a free copy of the Designer's Handbook No. 2. to:-

THE GLACIER METAL COMPANY LTD.

ALPERTON · WEMBLEY · MIDDLESEX

DRIEWRY

CARS

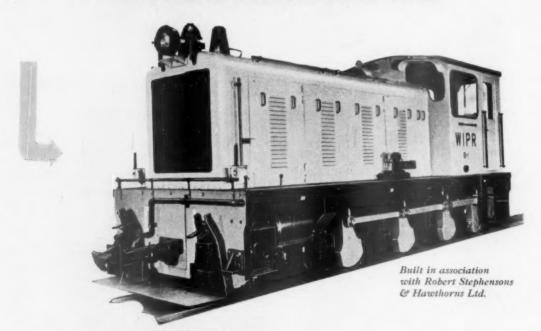


Built in association with The Birmingham Railway Carriage & Wagon Co. Ltd.

WITH MECHANICAL OR HYDRO-MECHANICAL TRANSMISSION

The upper illustration shows one of two Twin Car Units shipped this year to the Nigerian Railway Corporation, equipped with twin underfloor engines totalling 400 h.p. and multiple-speed epicyclic transmission with automatic control. The lower illustration is one of a number of 30-ton metre gauge Drewry locomotives recently shipped to Portuguese India, for freight and passenger duties.

AND LOCOMOTIVES



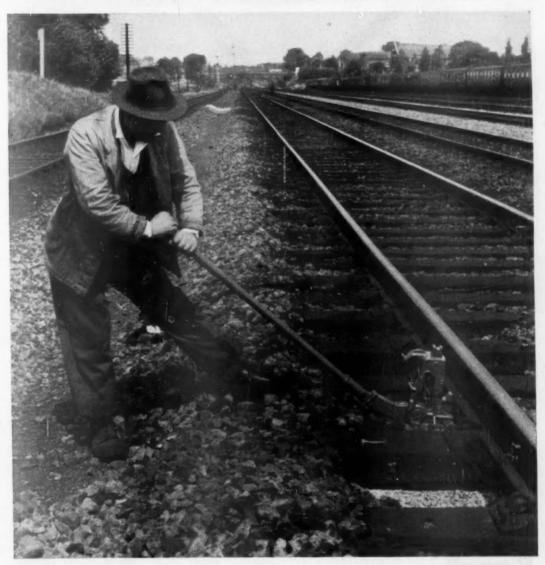
THE DREWRY CAR COMPANY LTD.

CITY WALL HOUSE, FINSBURY PAVEMENT, LONDON, E.C.2
TEL.: MONARCH 0671 GRAMS.: INNEAL, PHONE, LONDON



RATCHET TRACK JACKS

Designed to give Wheel Clearance, Tyre or Flange, with low lifting Toe obviating removal of ballast



Photograph by courtesy of British Railways, Eastern Region

ABTUS LTD.

VANDON COURT, PETTY FRANCE, WESTMINSTER, LONDON, S.W.1

Telephone: ABBEY 2312/3 Telegrams and Cables: ABTUS SOWEST LONDON

AUSTRALIA . DENMARK . EGYPT . INDIA & PAKISTAN . NEW ZEALAND . SOUTH AFRICA

All clear for progress! AEI Cables put the power behind British Railways' great

electrification schemes

Current schemes on which AEI cables are being installed by AEI Construction (Cables and Lines) Division include the following contracts for British Railways. London Midland Region: 24,000 yds. of 25 kV solid type track feeder cable for

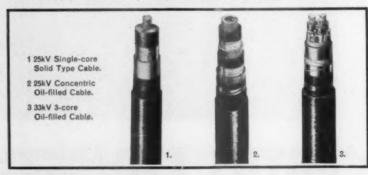
Manchester/Crewe Main Line electrification.

Glasgow Suburban electrification scheme: 17,200 yds. of 25 kV concentric oil-filled cable and 17,200 yds. multicore pilot cable.

Southern Region: London/Brighton Main Line: some 24 miles of 33 kV 3-core oil-filled cable and also pilot supervisory cables.

Eastern Region: Stratford to Shadwell: 3,700 yds. 33 kV 3-core oil-filled cable, 3,600 yds. 33 kV 3-core solid type cable and 7,300 yds. pilot/supervisory cables.

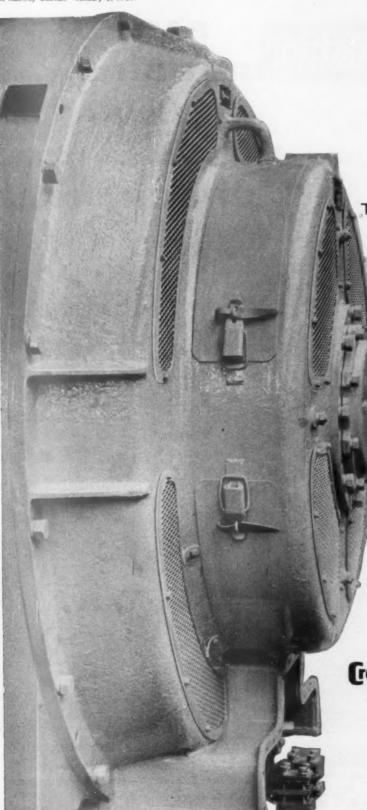
AEI are also supplying the cables for several important signalling contracts. Other cable installations include track feeder cables and cables for locomotives-in fact AEI can supply any cable required for railway electrification.





CABLE DIVISION

Associated Electrical Industries Limited 51/53, Hatton Garden · London · EC1 · Telephone: CHAncery 6822





AND MAKING TRACTION EQUIPMENT

You, as an engineer, know that there can be no sharp dividing line between designing and building. A good design incorporates experience gained in making, testing and commissioning similar equipment in the past. And, of course, it is also shaped by the experience of all sorts of people using the earlier designs under a variety of conditions that could not be simulated in any test laboratory.

To a long-established company such as Crompton Parkinson this process of feedback of information to the designer is fundamental.

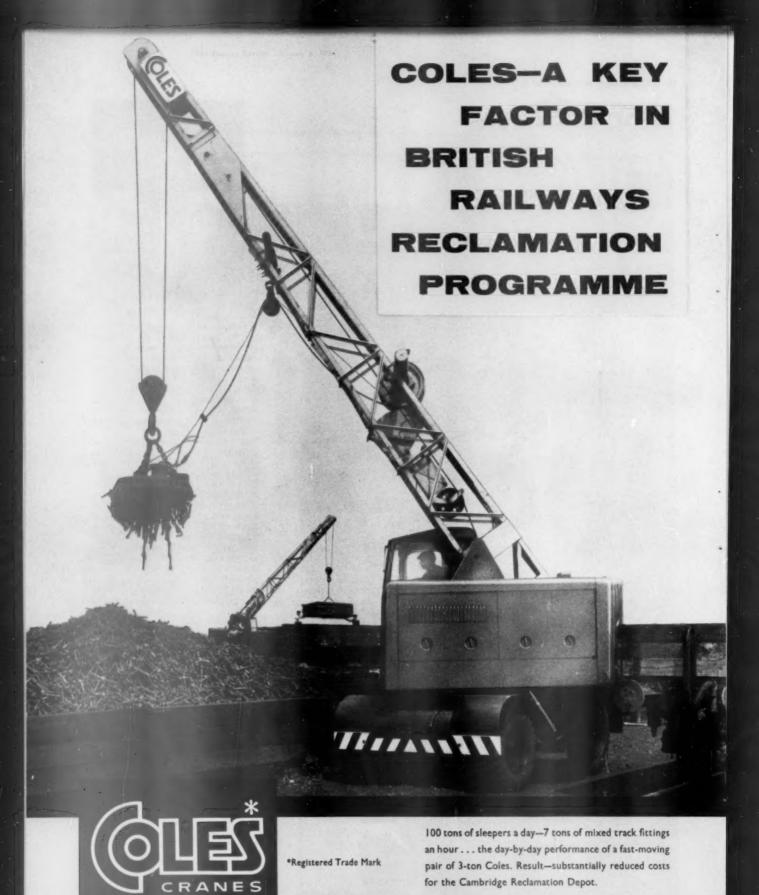
It is not always easy to put one's finger on the details on which it has had an effect. It shows up in the overall engineering rightness of a design-and of course in performance. In traction equipment, where space and weight must be kept down, and yet robustness and accessibility are at a premium, it shows up in the simplicity and elegance with which these conflicting demands are reconciled. As, for example, by the partial housing of the auxiliary generators within the main generators on the British Railways Type 4 diesel-electric locomotives. In the design of these generators we were able to make direct use of the experience we had gained with earlier generators for diesel-electric main line locomotives-as well as more indirectly from hundreds of other equipments for shunters, motor coaches and trolley buses.

Compton Parkinson



Traction Division, Chelmsford, Essex, Telephone: Chelmsford 3161. Telegrams & Cables: Crompark, Chelmsford.

Makers of Electric Motors of all kinds, A.C. and D.C. Generators, Cables, Switchgear, B.E.T. Transformers, Instruments, Lamps, Lighting Equipment, Batteries, Stud Welding Equipment, Traction Equipment, Ceiling Fans.



THE NAME THAT CARRIES WEIGHT

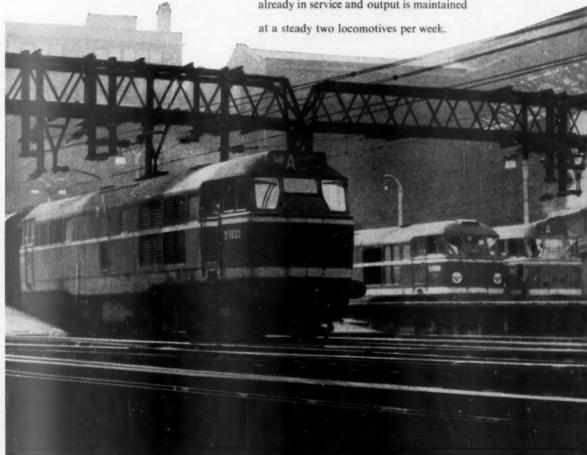
Cut YOUR costs with COLES.

HEAD SALES OFFICE: 143 SLOANE STREET, LONDON, S.W.I. SALES AND SERVICE: LONDON, BRISTOL, BIRMINGHAM,



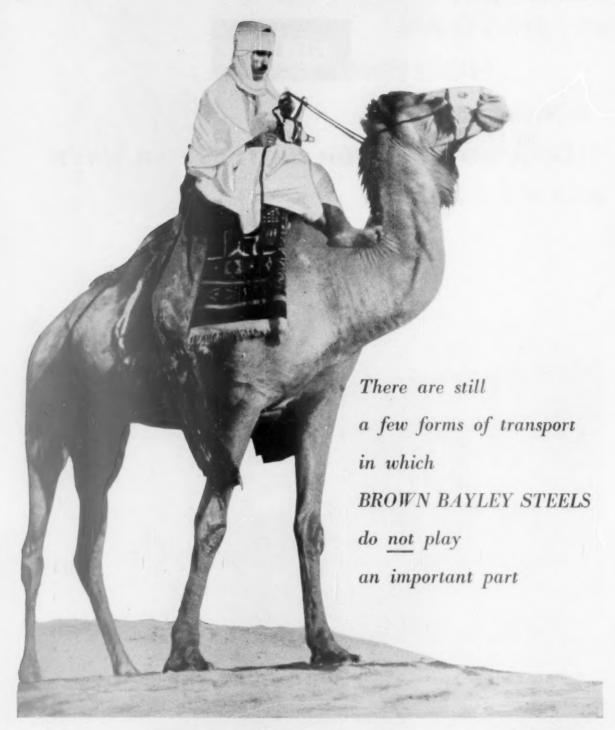
TWO HUNDRED AND TWENTY SIX LOCOMOTIVES FOR BRITISH RAILWAYS

226 Brush Type-2,1250-1365-1600 H.P.Diesel Electric Locomotives have been ordered for British Railways, over half of these are already in service and output is maintained



BRUSH

TRACTION DIVISION



BROWN BAYLEY STEELS LIMITED · SHEFFIELD



44

PULLMAN LUXURY COACHES





Four of which are already in service with



METROPOLITAN-CAMMELL CARRIAGE & WAGON CO. LTD.

HEAD OFFICE

SALTLEY BIRMINGHAM 8

LONDON OFFICE

VICKERS HOUSE BROADWAY WESTMINSTER S.W.1.

THE MILLS RAIL

AND BASEPLATE

Whenever a Mills Clip is fitted, it is fitted correctly.



Photograph by Courtesy of British Railways



BREDBURY STEEL WORKS

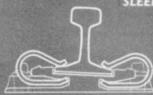
CLIP

FOR WOOD SLEEPERS



Four-hole baseplate with or without rubber rail pad.

FOR 'E' TYPE CONCRETE
SLEEPERS



Two-hole baseplate, interchangeable with CSI Bullhead Chair.

FOR 'F' TYPE CONCRETE SLEEPERS



Small Area two-hole baseplate for main line use. Every Mills Clip fitted applies a uniform load to the rail within a known range.

Very suitable for long welded rails and all heavy duty track

WOODLEY · NEAR STOCKPORT

Telephone: WOOdley 2231 (7 lines) 3431 (7 lines) Cables: Mills Woodley



WE ARE ENTERPRISING!

Is there something you need

which we can make?

We are in a position to undertake the manufacture of a wide range of railway components for mechanical and track requirements on a reasonable quantity production basis.

Typical components would be such products as rail clips, track pins and other fastenings, special bolts and upset bars and small forgings; gear blanks; etc.

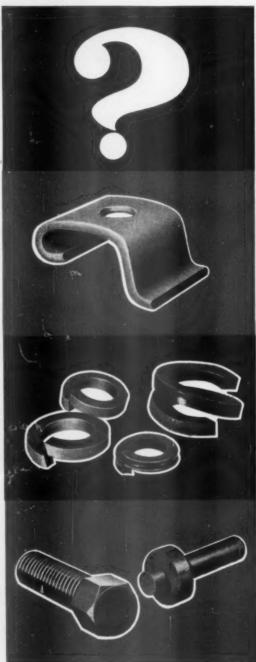
We are already well known in the railway world for our 'Kantlink' Spring Washers, single and double coil and special designs to railway specifications, and also for our Rail Clips and Pressings.

Even if your requirements do not lie within the types of product enumerated above, we are enterprising enough to consider specially the putting in of machines and production equipment to fulfil railway requirements. Let us know your possible requirements; we will consider them and make proposals for filling your needs at keen prices.

RAILWAY COMPONENTS

TOLEDO WOODHEAD (SHEFFIELD) LTD. CLIFTON WORKS · SHEFFIELD 3 · ENGLAND

Telephone: Sheffield 20108 (2 lines) Telegrams: "Lamcoil Sheffield 3" and at Coronation Works 'Aycliffe 'Nr. Darlington 'England Telephone: Aycliffe 2224/5/6 Telegrams: "Reliance Darlington"



NORTHEY ROTARY **EXHAUSTERS**

have been chosen by

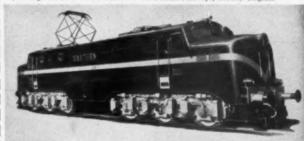
'ENGLISH ELECTRIC'

for these new locomotives

NEW FLANGE MOUNTED MODELS NOW AVAILABLE



2,000 h.p. diesel-electric locomotive for British Railways, Eastern Region



3,000 h.p. electric locomotive for the Eastern Railway of India.



Acknowledgments to Acknowledgments to The English Electric Company Ltd; British Railways, Eastern Region; Eastern Railway of India and Malayan State Railway.

Advantages - ● LOW STARTING TORQUE

- LOW OIL CONSUMPTION
- NO PISTONS, NO VALVES
- NO SLIDING VANES

Available in four standard sizes giving 90 c.f. min., 125 c.f. min., 180 c.f. min., and 250 c.f. min at 1,500 r.p.m. Permissible speed range for continuous running 800-1,600 r.p.m.

In operation on British, Indian, Malayan, Thailand, Israel, Pakistan and many African Railways.

Northey Exhausters are manufactured for Gresham & Craven Limited by Northey Rotary Compressors Limited, Parkstone, Dorset. GRESHAM & CRAVENLTD

15 WHITEHALL, S.W.I. TEL.: TRAFALGAR 6611-2



Cables: Loco Brake, London.

On the Liverpool St.,-King's Lynn run . . .



... with power by Mirrlees

A Mirrlees 1365 h.p. 'JV' engine powering a Brush type II locomotive is seen here leaving Ely.

Each week the engines made by Mirrlees—go to Loughborough ... each week the locomotives made by Brush—go to Doncaster ... each week, after the completion of Acceptance Trials further locomotives enter service on the EASTERN REGION.

MIRRLEES, BICKERTON AND DAY LIMITED HAZEL GROVE · STOCKPORT · CHESHIRE

Telephone: STEpping Hill 1000 (15 lines)

Telegrams: "Mirriees, Telex, Manchestes





diesels







STEEL, ALUMINIUM AND TIMBER WAGONS OF ALL DESCRIPTIONS AND CAPACITIES FOR HOME AND OVERSEAS RAILWAYS

> LAMINATED SPRING MANUFACTURERS



| | Cambrian | |



rolling



1 stock



POWELL DUFFRYN ENGINEERING CO. LTD.

CAMBRIAN WORKS, MAINDY, CARDIFF

Telephone: CARDIFF 29611
Telegrams: PEEDENG, CARDIFF







Photo by courtesy of British Railways (London Midland Region)

Investigation into track-spraying techniques has led to the development of two prototype sprayers. Completely modern in conception, and designed with the needs of today's diesel electric railways in mind, this equipment brings chemical weed control out of the steam age. Registered Trade Mark of J. R. Geigy S A Basle Switzerland

WEEDEX

cuts maintenance costs on railways

An intensive research programme carried out at the Chesterford Park research station on British Railways' weed problems, has proved Weedex to be the cheapest, safest and surest way of maintaining weed-free tracks and installations.

An annual treatment is an outstanding investment.

Weedex is sold overseas as Simazine 50W

FISONS

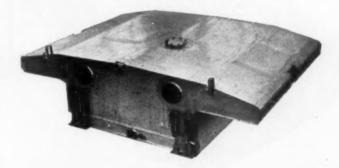


Weight on your mind?

If you've a weight-saving or heat-transfer problem on your mind, bring it to Marstons.



Marstons offer a comprehensive design and production service for locomotive components — from complete cab assemblies in light alloy and laminated plastic to element-type radiators in light alloy or copper-brass.

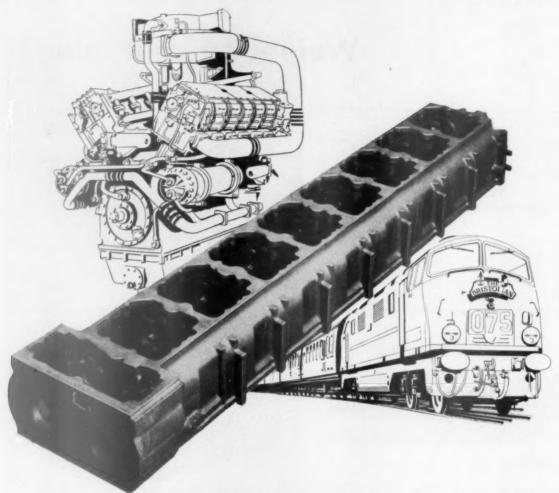


Long experience in this field enables Marstons' designers and technicians to find the quickest and best route to the solution of your problems.





Marston Excelsior Ltd., Fordhouses, Wolverhampton a subsidiary of Imperial Chemical Industries Ltd.



Britain's fastest express uses Harper Castings

The rocker covers on the Bristol Siddeley Maybach Diesel Engines are cast by Harpers and these 1200 h.p. engines power the new D800 class locomotives which haul such crack trains as the Cornish Riviera Express and the "Bristolian"—Britain's fastest Express.

Originally made as a series of steel castings welded together, these rocker covers are now cast in one piece in Harper-Meehanite, which is less expensive and cleaner in appearance. They weigh 410 lb. each.

Harper quality covers Grey Iron, Spheroidal Graphite Iron and Meehanite castings, metal pressings, machining, enamelling and sub-assembly work. Also makers of the famous Beatrice Oil Heaters and Harper Housewares.

The word MEEHANITE is a registered trade mark.

HARPER Castings

Send for our latest illustrated booklet on Harper Castings



JOHN HARPER & CO. LTD · WILLENHALL · STAFFS
Phone: WILLENHALL 124 (5 lines) · LONDON, Phone: ABBey 5906/7
MANCHESTER, Phone: BLAckfriars 0295
FOUNDED 1790
H 671

Wheels Tyres Axles

for the railways of the world



RINGS and CIRCULAR DIE FORGINGS

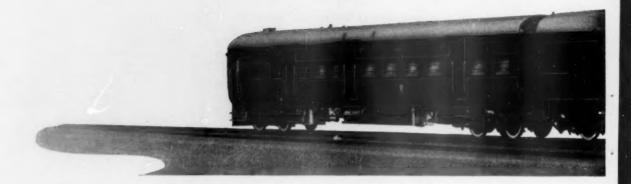


Seamless Rings in Carbon and Alloy Steels. Flanges of all types. Gear Rings and other rings with square, rectangular or profiled cross section, from 6 in. (minimum weight 70 lbs.) to 78 in. inside diameter and from 2 to 12 in. axial width. Circular Die Forgings, maximum weight 2,000 lbs.—plain or punched slabs and special shaped forgings up to 40 in. diameter.

Tay OF BROS. & CO. LTD

TRAFFORD PARK STEELWORKS, MANCHESTER 17

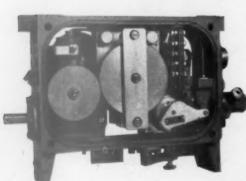
LONDON OFFICE: ST. ERMIN'S, CAXTON STREET, WESTMINSTER, S.W.1



The Nigerian Railway Corporation have recently put into service two of these Twin Unit Diesel Railcars, supplied by the Drewry Car Co. Ltd., and built by Birmingham Railway Carriage & Wagon Co. Ltd. Each unit is fitted with Metcalfe-Oerlikon Patent Safety & Vigilance Control Equipment.

ANOTHER INSTALLATION OF THE

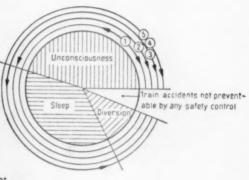
Automatic Safety &

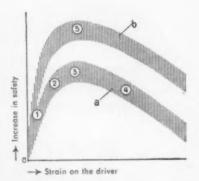


View of the safety side of the apparatus with the covers removed.

- Normal Deadman's pedal.
- 2 Encased pedal for instep.
- 3 Sewing machine type pedal.
- 4 Pedal which must be periodically released.
- 5 Normal Deadman's pedal connected with the PATENT SAFETY and VIGILANCE CONTROL SYSTEM.
- a Range of existing safety controls with pedals.
- b Range of the Metcalfe-Oerlikon safety control.
- 1-5 Various pedal arrangements as fig. 1.

THESE CHARTS ILLUSTRATE
THE SUPERIOR CONDITIONS
AND RANGE OF SAFETY
OBTAINED FROM THE
SAFETY AND VIGILANCE
CONTROL SYSTEM.





For full description write for leaflet A.41

DAVIES & METCALFE LTD.



Control System

The Metcalfe-Oerlikon patent Safety and Vigilance Control System is wholly British made and provides a reliable and simple protection against the Driver becoming inattentive or failing to carry out his duties for any reason whatsoever. The equipment operates on a distance cycle and possesses a number of important features and advantages, further the reliability and effectiveness of this system has been well proved in widespread service on railways for more than twelve years.

The Patent Safety and Vigilance Control System is robustly made and embodies the maximum number of safety features in addition to being completely foolproof in operation. It is now fitted to a very large number of locomotives operating under a wide range of service conditions on railways throughout the world.

A particularly important feature is the automatic cancellation of the equipment by the Driver's normal operation of his controls, including the Master Controller, Brake Valves, etc. This arrangement together with operation on a distant cycle relieves the Driver of distraction or additional responsibility whilst at the same time providing the maximum range of safety. The equipment which has proved to be very popular with Drivers is easily fitted to new or existing locomotives and is suitable for use with all types of Brake Equipment.

INJECTOR WORKS · ROMILEY · ENGLAND

Telephone: WOODLEY 2626 (2 lines)

Telegrams: EXHAUST, ROMILEY

sliding surfacing and screwcutting lathes. 13' and 17' swing. model J6. 12 Spindle speeds_Nickel chrome, hardened and ground Pre-loaded spherical roller bearing spindle and the bearings pump lubricated with filtered oil. Pump labrication to feed gear-max, apxon and saddle. Totally enclosed multi-feed gear-box. Hardesed sizel wear strips on t JOHN LANG & SONS LTD. ASSOCIATED BRITISH MACHINE TOOL MAKERS LIMITED 17 GROSVENOR GARDENS SWI JOHNSTONE RENFREWSHIRE SCOTLAND Telephone: Johnstone 400 Telegrams: "Lang Johnstone





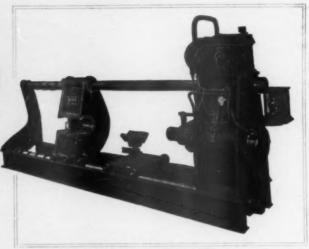
Railway

Workshop

Machinery

by HENRY BERRY & CO. LTD. HYDRAULIC WHEEL PRESS

The illustration represents an improved type of Single-ended Wheel Press, for dealing with both crank and straight axles, complete with built-in electrically driven pump, continuous pressure recording gauge, etc. When enquiring, enclose drawings showing various types of Wheels and Axles to be dealt with, also details of electrical supply available at site. We also specialise in High Pressure Hydraulic Plant for Railway Workshops.



THE RESULT OF SEVENTY YEARS' EXPERIENCE ON THE RAILROADS OF THE WORLD

We manufacture Hydraulic Pumps, Accumulators, Valves, Wheel Presses, Presses for Flanging, Forging, Spring Making, Plate Bending, Pipe Bending, Hydraulic Rivesters, etc. Our Technical Department is at your service to help in any problem and prepare special designs.

HENRY BERRY & COMPANY LIMITED CROYDON WORKS, LEEDS, 10

Telephone: LEEDS 75481-2

Grams: "RIVETTER, LEEDS 10"



Branches at Glasgow, Birmingham, Manchester and Newcastle-on-Tyne

BECLAWAT Journalo UNIT WINDOWS

This Unit window was designed specially for South African Railways. It includes both a glass and a gauze sash, the former being balanced by constant force springs. The Sashes are of stainless steel, and the pan frame of Corten Steel.

Nearly 4,000 windows are now being supplied for Artisans Coaches.





BECKETT, LAYCOCK & WATKINSON LTD.

ACTON LANE, LONDON N.W.10

AUSTRALIA, CANADA, INDIA, SOUTH AFRICA & SWEDEN

British Railways

"CONDOR"

EXPRESS FREIGHT SERVICES

run on

SPHERICAL ROLLER BEARING AXLEBOXES



OVER 1.300.000 SMF ROLLER BEARING AXLEBOXES HAVE NOW BEEN SUPPLIED TO THE RAILWAYS OF THE WORLD

The

RAILWAY GAZETTE

A journal of Management, Engineering and Operation

INCORPORATING: THE RAILWAY ENGINEER - TRANSPORT - THE RAILWAY NEWS - THE RAILWAY TIMES - RAILWAYS ILLUSTRATED HERAPATH'S RAILWAY JOURNAL (ESTABLISHED 1835) - THE RAILWAY RECORD - THE RAILWAY OFFICIAL GAZETTE

VOL. 114 FRIDAY JANUARY 6 1961 No. 1

CONTENTS

							PAGE
Editorial Notes			***	***		***	1
Railways in 1861							3
Scottish Train Alterations							4
International Union of Rails	ways						5
Letters to the Editor	***	***	***	***	***	***	5
The Scrap Heap	***						7
Overseas Railway Affairs	***	***	-		244	***	8
Publications Received							9
Japanese Diesel-Hydraulic	Trains						10
Air Conditioning on the Mis	stral						14
Obtaining a Smooth-Runnin	g Bogie						17
Personal	***	110			***	***	21
New Equipment and Process	ses						23
News Articles		***	***	***		5.0.4	25
Contracts and Tenders	144	***		1.11	***	***	29
Notes and News	***		***	***	444	***	30
Pailway Stock Market and	Official	Notic	P6				32

Editor: B. W. C. Cooke, Assoc. Inst. T.

33 TOTHILL STREET, WESTMINSTER, LONDON, S.W.1

Telephone: WHItehall 9233 (24 lines) Telegrams: "Trazette Parl London"

BRANCH OFFICES

GLASGOW : 139. Bothwell Street, C.2		***	Central 4646
NEWCASTLE UPON TYNE: 21. Mosley 5	Street	Newcz	istle upon Tyne 22239
MANCHESTER: Century Insurance Buildin	g. St. Peter's	Square	Central 7667-8-9
BIRMINGHAM: 90, Hagley Road, Edgbast	on	Edgbasto	on 2466-3728-3732
LEEDS: 70. Albion Street	***		Leeds 27174
BRISTOL: 20, Victoria Square, Clifton	*** . ***	***	Bristol 33873
Annually £5 by post		Single	copies. Two shillings
Registered at the G.P.O. as a newspaper.	Entered a	is second-c	lass matter in U.S.A.

British Railways Board

ALTHOUGH the recent White Paper on the reorganisation of the nationalised transport undertakings was so nebulous as to leave endless room for speculation as to the intentions of the Government, one thing at least is clear. This is that once more there will be a holdup in the development of British Railways. There has been created a new hiatus during which speculation and uneasiness inevitably will be rife within the industry. The overall effect cannot fail to be costly in the end. The chief item of speculation among railwaymen at the present time obviously is in the composition and powers of the British Railways Board. This, states the White Paper, will perform "only those central functions which are essential to the running of the railways as a single entity; all other functions will be the responsibilities of the Regional railways boards." That could mean much or very little; a great deal will turn on the composition of that board. Even in the weird world of fantasy which now appears to envelop the Government when it considers railway matters, it is surely inevitable that the Chairman of the Railways Board will be a responsible railwayman of knowledge, experience, and status, and will command the respect and loyalty of railway officers throughout the country. This might not be in line with previous thinking on the holders of chairmanships of nationalised industries, but it would be all the more valuable because of that. The qualifications and responsibilities of the other members of the board are indeterminate enough and would appear to give quite extraordinary powers to the Minister of the time in their selection. It would allay apprehension and tend to restore confidence in the intentions of the Government if an early statement were made that the Chairman at least would be a practising railwayman.

Reaction to the White Paper

THE GOVERNMENT'S White Paper on the reorganisation of the nationalised transport industries drew comment surprisingly consistent in lack of enthusiasm and concern at the vagueness of its proposals. Although not showing the alarm of Mr. Francis Noel-Baker, Labour M.P. for Swindon, who, as recorded on another page, believes "the new set up will put the railways at the mercy of a malicious Minister," journalistic opinion of every political shade was guarded in its assessment of proposals the exact nature of which was generally found to be unclear. More than one newspaper agreed with The Economist, which thought the Government's plan begged the vital question of the size and shape of the re-formed railways and doubted the wisdom of writing off deficits not yet formed while aiming at year-to-year " targets of financial performance." The Daily Mail and The Daily Telegraph remembered previous railway deficits, loans, and unfulfilled promises to repay. The Financial Times drily observed that "the Government... has agreed to forgo income which it would never have received," and thought the present deficit might be back within five vears.

The uneconomic service

CLOSELY linked with the question of the future size and shape of the railway system is that of the uneconomic service, the provision of which is demanded in the interest of the public. This is an issue on which both The Financial Times and The Railway Review directed considerable attention. The Financial Times pointed out that the Government apparently still had to consider the uneconomic service and added that there was no doubt that nationalised industries were generally expected to serve the national interest in a way not expected of private enterprise; successive Governments had not hesitated to interfere with their affairs in a way which no private company could tolerate. So long as there remained confusion between commercial and public aims, these industries were unlikely to operate at maximum efficiency. Writing in The Railway Review, the National Union of Railways observed the matter of the uneconomic service to be one which "seriously affected" its membership. The union proposes to arrange an early meeting of the three railway unions to formulate a joint policy in connection with the White Paper.

Quo vadis, B.T.A. ?

WIDESPREAD speculation about the future of British Transport Advertising followed the publication of the Government's plan for the reorganisation of nationalised transport undertakings. This is the opening statement of last week's Advertiser's Weekly, which added: "There is no mention in the White Paper of this thriving organisation, but the indications are that it will become a separate company similar to Thomas Cook and the nationalised bus companies." The Commission makes no comment, but it should be remembered that the Select Committee stated that British Transport Advertising had been established as a separate division. As pointed out by Advertiser's Weekly, B.T.A. is a successful organisation-it is known that, competing with private enterprise media such as television and the press, it has just enjoyed a record year. According to the Commission's published reports, the previous record seems to have been established in 1956 with £3,337,852, which must mean that the present annual figure is around £31 million. This go-ahead and efficient commercial enterprise should retain, either as a company or in some similar form, the corporate constitution which has proved so successful.

Unhonoured

ON THE occasion of the Birthday Honours, we drew attention to the meagre share accorded to railway officers. The New Year Honours List confirms the impression that the vital services rendered to the industrial and economic life of the country by the railways are being seriously overlooked. It is gratifying that a C.M.G. has been bestowed on Mr. J. W. S. Pegrum, who, for the past three years, has borne the responsibility of the general managership of the Rhodesia Railways, and satisfying to learn that the services of Mr. H. H. Powell, Architect, British Railways, Eastern Region, and Miss N. Cotterill of the British Transport Hotels & Catering Service have been recognised, but one searches in vain for the names of other railway personnel, either in this country or in the Commonwealth. Among industrial leaders connected with railway affairs who have been honoured are Dr. C. Dannatt, (K.T.), Vice-Chairman, Associated Electrical Industries Limited; Sir Ellis Hunter, (K.G.C.), Chairman & Managing Director, Dorman Long & Co. Ltd.; Sir Arthur Morse, (K.B.E.), former President & Chairman, British Travel & Holidays Association; and Mr. G. E. Beharrell, (Kt.), Chairman, Dunlop Rubber Co. Ltd.

Steel output increases

VIGOROUS development of production facilities and efficient management are enabling the British iron and steel industry further to increase production and exports. Output this year is to be 24.5 million tons, against 24.2 in 1960; the latter total represented a rise of 20 per cent over production in the previous year. A record of 4.2 million tons of direct steel exports was achieved in 1960. The value, some £230 million, more than covered the cost of all raw material imports needed by the industry. Despite increasing competition overseas, exports this year are likely to be maintained. Even greater efforts will be made to reduce costs. Two new strip mills of Richard Thomas & Baldwins Limited and Colvilles Limited are expected to be in operation by the end of the year. Production of billets will be increased by completion of two rotor furnaces for prerefining and by commissioning of the continuous billet mill at the Richard Thomas & Baldwins Redbourn works. Largely because of the addition of two to the existing three modern strip mills, the production capacity of this country will be over 30 million tons in 1962. The scale and pace of this increase in potential exceed anything planned for this period on the Continent. By 1965 annual capacity may well be more than 34 million tons. This will

involve expenditure of at least £450 million. The industry plans to meet the probable average long-term demand, say 30 million tons in the mid 1960s, and also to provide for fluctuations in requirements. This expansion of the industry has been made possible by the co-operation of British Railways. Movement of ores to plants and of steel products to ports and to destinations within Britain is facilitated by special types of wagons and by carefully planned movement. The railways also are important customers of this vital industry, and will remain so while they can implement their plans for new equipment.

Changes at Beyer, Peacock

AFTER some 37 years as an executive directly concerned with the management of Beyer, Peacock & Co. Ltd., Mr. Harold Wilmot, as from January 1, has resigned the Managing Directorship of that company, which is also the principal unit in the group he has built up. He will remain Chairman and he is being succeeded by Mr. James Hadfield as Managing Director. Mr. Hadfield has also served Beyer, Peacock in various capacities over a period of 36 years and is very well fitted to assume the wider responsibilities which now fall to him. Mr. Wilmot is an outstanding personality in the locomotive industry, a position which was recognised in 1956 by his election as President of the Locomotive & Allied Manufacturers' Association of Great Britain, and for which organisation, and its predecessor, the Locomotive Manufacturers' Association, of which he held the Presidency from 1947 to 1950, he has done outstanding work. He was the moving spirit behind the erection of Locomotive House, the headquarters of the industry in London. In a wider field he has attained prominence as the Chairman of the British Institute of Manage and and President of the Cost & Works Accountants which he held for three years. Mr. Wilmot, who very early in life had a special aptitude for the problems connected with production management and control, joined Beyer, Peacock & Co. Ltd. as Cost Accountant in 1924 and within two years had become Chief Accountant. He became Managing Director in 1938 and has combined that office with that of Chairman since 1949.

Ministerialrat Johann Schubert

THE RETIREMENT of Mr. Johann Schubert from the position of Deputy Chief Mechanical Engineer of the Austrian Federal Railways at the end of 1961 not only removes from the active scene a railwayman well known in Western European circles by his participation in O.R.E. matters, but removes a link with two unusual features. First, Schubert began his professional career in that short period between the old Königliche & Kaislerliche Staatsbahnen, and the present O.B.B. or Austrian Federal Railways, when the system was known simply as the Oesterreichische Staatsbahn. Many years later, during the second world war, after he had been sent to Germany, Schubert was engaged in the preliminary design and planning of that stupendous project for a three-metre gauge railway to carry a 32-ton axle load which was to stretch from the Ruhr area through Munich, Vienna and Budapest to the Craiova area, and with a connecting line from the Ruhr through Berlin to the eastern front. But with peace, Schubert returned to more normal activities in Austria, and as chief of the design and planning section has been intimately connected with the electric and diesel locomotive classes built over the last 14 years.

Traction transformer troubles

MUCH of the evidence given at the recent Ministry of Transport enquiry into the incidents which led to the withdrawal of Glasgow suburban electric trains, British Railways, Scottish Region, summarised elsewhere in this issue, pertained to the conservator tanks which function with the transformers to permit the free flow and expansion and contraction of oil to the transformers. Mr. J. A. Broughall, Chief Electrical Engineer

(Development), British Transport Commission, stated that power vehicles of 50-cycle stock will probably have their conservator tanks put on the outside of each unit instead of inside the guard's van. It is likely that the change will be made on more than 200 units, apart from the 37 in the Scottish Region on which the conversion already has been completed. Mr. Broughall described incidents in which vaporised oil in the transformer had ascended by the connecting pipe to the conservator tank and later became mixed with air, causing an explosion or fire with damage to the equipment. It would appear that the root of the trouble is the overheating of the main transformer. Stock in the Eastern Region was withdrawn because of traction motor failures, and the fact that it will probably undergo conservator tank modifications does not imply that it has experienced transformer troubles. This is obviously a safety measure.

Diesel express trains on Japanese Railways

Possibly the most striking feature of the Japanese National Railways' new diesel-hydraulic express train sets (described elsewhere in this issue) is the arrangement of the power units, wherein a total of no less than 14 engines of 180 h.p. each is distributed throughout the length of a nine-car train. of our readers may be inclined to compare it with the installation in the British Railways diesel-electric Pullman sets recently introduced on the Western and London Midland Regions. The eight-car Western Region version has a weight almost identical with that of the Japanese train, and its traction power requirements are met by the provision of two 1,000-h.p. dieselgenerator sets. These are installed in accessible engine-rooms, in contrast with the undercar mounting of the Japanese engines. The choice of the multi-engine installation on the Japanese trains was undoubtedly influenced by the fact that a version of the standard engine, already applied to a large number of railcars, could be used, with consequent advantages in respect of maintenance procedure and interchangeability.

Superheater Co. Ltd. jubilee

SUCCESSFUL application by Wilhelm Schmidt in 1887 of his apparatus to Prussian State Railways Locomotives began, for practical purposes, the development of the superheater; though the problem of retarding the condensation of steam had been investigated in 1830 by Trevethick, and in 1857 by Hirn in Germany. Associates of Schmidt were quick to develop his device in Britain for railway and other purposes. The Superheater Co. Ltd., with headquarters in London, was founded on December 19, 1910. The present works were established in Trafford Park, Manchester, in 1914. In locomotive superheating the company's influence and achievements throughout its history have been world-wide. Some 70 per cent of its production of locomotive equipment today is exported. Many thousands of engines include MeLeSco superheaters; these often incorporate the MeLeSco multiple valve regulator, positioned in the smokebox.

Short route to Central Africa

British enterprise played an important part in creating the Benguela Railway, the shortest route from Europe and America to Katanga, and Northern, and for many transits Southern, Rhodesia. The 3-ft. 6-in. gauge line runs from the Atlantic port of Lobito, in the Portuguese territory of Angola, for 838 miles to the Katanga frontier, whence there is through running to Rhodesia, Mozambique, and South Africa. The Benguela Railway Company was incorporated in Portugal in 1902 and operates under a 99-year concession granted to its founder, Sir Robert Williams, who conceived the project as an outlet for the Congo copper mines. Ninety per cent of the share capital is held by a British company, Tanganyika Concessions Limited, which also owns all the

income debentures, and 10 per cent by the Portuguese Government. Since its completion in 1928 and the junction with the Katanga-Dilolo-Leopoldville Railway in 1931, exploitation of mineral wealth in Katanga and Rhodesia has much increased the line's importance. Nearly all the equipment, including the Beyer-Garratt locomotives, is British built. A booklet describing the principal features of the railway is the subject of brief notice on page 9.

Holiday variety

THE DESIRE of many more people in Britain for recreation in novel surroundings and farther afield is catered for in the programme, "Holidaymaking, 1961," of Thos. Cook & Son Ltd. This is the subject of brief notice on page 9. Holidays in Greece include for the first time Sunium, in Attica, on its promontory amid magnificent scenery. The discriminating traveller can journey to Greece by "Simplon Orient Express" to Venice, and thence down the Adriatic by sea. Other new opportunities are a stay at Royan, completely rebuilt since the war, on the Côte de Beauté, north of Bordeaux. The additional comfort of a second class couchette berth in one of Cook's mid-week special trains to Switzerland is available for only 10s. The intending holidaymaker can choose from practically all Europe west of the Iron Curtain-and from the U.S.S.R., and from North America and North Africa. Thos. Cook & Son Ltd. caters also for the winter sportsman.

Railways in 1861

PARLIAMENT had little opportunity to forget railways 100 years ago, as no fewer than 261 Bills were deposited for the 1861 session. Of these, 240 were to authorise new works throughout the United Kingdom comprising 2,015 miles of railway to be built by 117 new companies, and 1,002 miles by 123 existing companies. Many of the schemes were withdrawn or rejected in committee, but 145 Acts for railways in Great Britain (excluding Ireland) received the Royal Assent, the largest number in one year since 1847 (during the Railway Mania). Additional powers to existing companies were granted by 104 Acts, and 39 incorporated new companies. In all, upwards of 1,000 miles of new railway were authorised, involving capital powers of more than £22½ million. Among the new railways were the Inverness & Perth Junction, the Aberystwyth & Welsh Coast, the Cockermouth, Keswick & Penrith, and the Hammersmith & City. Two new termini for London were authorised, namely, Broad Street and Cannon Street. An important engineering work sanctioned to the L.N.W.R. was the Runcorn Bridge across the River Mersey on a new cut-off line shortening the distance between Liverpool and the South by avoiding the detour through Warrington. Special charging powers were granted, as otherwise the L.N.W.R., which already owned the shortest route, would have had reduced revenue as a result of its enterprise.

Preservation of competition and avoidance of monopoly appear still to have been guiding principles in Parliament. Although acquisitions of branch-line companies by main lines were sanctioned, major amalgamations were refused, or approved only with reluctance and hedged with protective clauses. A renewed attempt by the Caledonian, the Edinburgh & Glasgow, and the Scottish Central Railways to obtain powers for amalgamation was again defeated. The North Eastern Railway had been in negotiation with the Stockton & Darlington and the Newcastle & Carlisle, and a large measure of agreement had been reached, but a Bill to amalgamate the N.E.R. and N. & C.R. was opposed bitterly by some and could not be secured in that session, although it became law in 1862, after concessions had been granted to neighbouring railways. Between the N.E.R. and the S. & D.R., an arrangement for interchange and division of traffic came into force on January 1, 1861, but amalgamation was not sanctioned by Parliament until 1863. The Birkenhead Railway was vested in the G.W.R. and L.N.W.R. jointly by Act of July 11, which sanctioned a transfer that had been made on the previous November 20. On April 30, 1861, the surprising news was made known that the G.W.R. and the West Midland Railway had settled their differences and proposed amalgamation. A leasing agreement was made from July 1, and, at the end of September, Paddington succeeded Euston as the London terminus for Worcester and the West Midland Railway generally. Amalgamation was strenuously opposed in Parliament, and did not become effective until August 1, 1863, by which time opponents had been pacified by special clauses and scheduled traffic agreements. Committees of the House of Commons showed some disposal in June to sanction clauses in railway Bills which would have assisted railways in matters of terminal and demurrage charges, but deferred doing so at the urgent request of colliery interests.

According to the Board of Trade Returns, the public railway mileage in Great Britain increased during 1861 by 373 miles (209 in England & Wales and 164 in Scotland), raising the total from 9,069 to 9,442. This is approximately one-half of the present mileage of the country, but substantially less than onehalf of the peak figure of 20,463 miles in 1927. Some of the principal openings of 1861 are listed in our Scrap Heap columns this week. The longest were the Portpatrick Railway of 531 miles from Castle Douglas to Stranraer, and the 34½ miles from Barnard Castle to Tebay. The London, Chatham & Dover Railway was extended from Canterbury to Dover, and from Whitstable to Herne Bay. The year also saw the modest opening of the first part of the North British Waverley route to Edinburgh. October 1 was noteworthy for the introduction of the " narrow" (or standard) gauge to Paddington, when the 37 miles from Reading West Junction to Paddington became a mixed-gauge line. This gave the G.W.R. through standardgauge communication between Paddington, Birmingham, Wolverhampton, and Birkenhead.

The year was unfortunate for railway accidents, with eight in which 46 passengers in all were killed. On January 4 there were four accidents in one day, and on January 28 the death of Dr. Baly, Physician to the Queen, at Raynes Park on the L.S.W.R., attracted considerable public attention. With the latter, the coroner's jury recommended that additional brake power "should be applied to all railway trains." On August 25, a collision at Clayton Tunnel, L.B.S.C.R., between a Parliamentary train and an excursion train caused the death of 23 passengers and injury to 176. The fatalities were the largest at that time in any one accident on the railways of Great Britain, and were not exceeded until the Abergele collision on the L.N.W.R. almost exactly seven years later. Within a few days of the Clayton Tunnel disaster, another collision resulted in the death of 16 persons, and injury to some 320, in a North London Railway train at Kentish town.

Competition with railways, which later was to assume considerable importance, was beginning in a small way in the form of street tramways and road railways, at first horseoperated. George Francis Train, a remarkable and erratic American, who had opened his first English street tramway at Birkenhead in 1860, extended his activities to London. Without Parliamentary powers, but under licence from the highway authorities, he opened his well-known tramway from Marble Arch to Porchester Terrace, Bayswater, on March 23, 1861. His second London line, from Victoria Station to Westminster Abbey, along Victoria Street, was opened on April 15; the third, from Westminster Bridge to Kennington Gate, on August 15. In May, 1861, "leading merchants and other parties interested" produced a scheme for a tramway or road railway along the high road between Edinburgh and Glasgow. This did not mature, but it was indicative of thought towards an alternative to railways. Other events of 1861 at home included the reduction of income tax from 10d. to 9d.; the death on October 13 of Sir William Cubitt, the eminent railway engineer, aged 76; the death at the age of 80 on April 19 of General Sir Charles Pasley, Inspector-General of Railways, 1842-1846;

the collapse of a tunnel on the Midland Railway at Sheffield on February 25; and the falling-in of a portion of the Metropolitan Railway (then under construction) in the Euston Road on May 24. Trial trips over finished portions of the Metropolitan—the world's first urban underground railway—were made in December.

Abroad, Paraguay was added to the list of countries with railways. The Paraguay Central had its origin in surveys begun in 1854 by English engineers on behalf of the Government. The first section, from Asuncion to Trinidad, was opened in September, 1861, and by the end of the year the line had reached Paraguari, a total distance of 45 miles. The first railway in what is now Pakistan was opened on May 13, namely, the 105 miles from Karachi City to Kotri. In Russia, apart from the Moscow-Petersburg (now Leningrad) railway, opened on November 13, 1851, only a few railways were built (excluding Russian Poland) before the sixties, but in 1857, a concession for 2.600 miles of line had been given to a Franco-British syndicate, and some important sections were completed by 1861. As a result, Petersburg was united to the network of European railways in December, but with a break of gauge. March 3 marked the emancipation of serfs in Russia. A newly united Italy held its first Parliament at Turin on February 18 (Rome and Venice were not then incorporated in it) and Victor Emmanuel was proclaimed King. The London merchant banking house of C. J. Hambro & Son (which later provided the G.W.R. with a Deputy Chairman) handled many of the financial transactions of the new country, beginning with the issue of a loan of £1,782,000 for the Maremmana Railway. Continental travel was facilitated by the abolition of passports in France for British subjects, from January 1. In the U.S.A., the outbreak of the Civil War arrested the progress of what had been the most extensive railway expansion ever seen. From 9,021 miles of line open at the end of 1850, the country's total had risen to 30,626 miles in the decade to the end of 1860. During 1861 only 660 miles were added.

Scottish train alterations

FROM January 2 an important change has been made by British Railways in the working of the down "Midday Scot" (12.50 p.m. from Euston). The restrictive loading has ceased, and the train now stops at Crewe (3.56—4.2 p.m.), picking up the through coach from Plymouth to Glasgow previously worked forward on the 1.5 p.m. from Euston. Carlisle is reached 13 min. later, at 6.25 p.m., and Glasgow Central at 8.35 p.m., 20 min. later. West of England passengers are into Glasgow 2½ hr. earlier than their previous 10.50 p.m. arrival. As the down "Royal Scot" is now calling at Preston, and the up "Midday Scot" at Crewe, the only Euston-Glasgow day trains still non-stop between Euston and Carlisle are the down and up "Caledonian" and the up "Royal Scot." The limited formation of the up "Midday Scot" also is abandoned, and Euston is reached at 9.5 instead of 9 p.m.

Buffet as well as restaurant cars are now run in each direction on the "Royal Scot" between Euston and Glasgow Central, and the "Thames-Clyde Express" between St. Pancras and Glasgow St. Enoch, on weekdays and Sundays alike; and the 7.10 p.m. "Northern Irishman" from Euston to Stranraer is provided with a restaurant car as far as Crewe. The 4.35 p.m. from Liverpool Exchange to Glasgow calls additionally at Lockerbie at 7.48/7.50 p.m.

The 8.23 p.m. from Carlisle to Glasgow, which formerly preceded from Carlisle the 1.5 p.m. from Euston to Perth, conveying the through coach from Plymouth, has been withdrawn. Between January 4 and February 25 various local trains in the off-peak hours between stations on the Carlisle-Glasgow main line and Glasgow Central will run to and from the Low Level station instead, to facilitate the signalling changeover.

North of Glasgow the 5.15 p.m. from Glasgow Buchanan Street to Oban now runs no further than Callander, and its restaurant car is transferred to a new 6 p.m. express, which stops only at Stirling to Callander, and reaches Oban at 9.57 instead of 9.35 p.m. The experimental fast diesel multiple-unit trains with miniature buffet cars between Aberdeen, Elgin, Forres, Nairn and Inverness, with their $2\frac{1}{2}$ hr. schedules, have attracted sufficient patronage to justify their continuance indefinitely, from Aberdeen at 8.45 a.m. and 5.30 p.m., and from Inverness at 8.30 a.m. and 5.15 p.m.

International Union of Railways

IT is customary for the Board of Management and for the General Assembly of the International Union of Railways, more commonly known as the U.I.C. from its French title, to meet at the headquarter offices in Paris at the end of November. The meetings held in November, 1960, namely the 19th General Assembly and the 56th and 57th meetings of the Board of Management, were of exceptional interest in that they marked the taking over of the chairmanship for the first time by Great Britain, and there were other organisational changes which provide important landmarks in the history and development of the U.I.C.

The change in chairmanship was in conformity with the decision taken some years ago that this key position should be held in rotation by the larger European railway administrations and, in consequence, Dr. Oestering of the German Federal Railway has held this position for the last two years and is now succeeded by Mr. Ratter, Member of the British Transport Commission. Prior to 1958 the chairmanship had invariably been held by the French Railways, notable personalities who had occupied this position being Monsieur Mange, Monsieur Le Besnerais, Monsieur Lemaire and Monsieur Armand Another important change has taken place, operative from the beginning of 1961, with the appointment of Monsieur Louis Armand as Secretary-General in succession to Monsieur Jean Tuja who, having reached the age of retirement, has terminated twelve years of distinguished service in this appointment. The Union will benefit during the current year from its ability to call on Monsieur Tuja in a consultative capacity. Other changes submitted by the Board of Management to the General Assembly, and duly approved by the latter, related to the increase to 14 of railway administrations represented on the Board of Management: The two additional members are the Austrian State Railways and the Hungarian State Railways.

Thus, for 1961 and 1962, the Board of Management will consist of representatives of the railway administrations of Austria, Belgium, Czechoslovakia, France, Germany (West) and Germany (East), Great Britain, Hungary, Italy, Netherlands, Poland, Portugal, Sweden and Switzerland (Federal Railways). As from the beginning of 1961 the Information Centre of the European Railways (C.I.C.E.), for which the Italian State Railways have been responsible since its inauguration, is reorganised into two separate sections, one dealing with publicity, which will continue under Italian chairmanship, and one covering public relations, with a Swiss chairman. The new combined title of the two activities will be Committees of the Information & Publicity Centre of the European Railways (C.I.P.C.E.), which one has to admit is a somewhat cumbrous title. Another change is the formation of an international railway film bureau, replacing the long-existing "meeting of railway film experts" for which the Swiss Railways have been responsible in the past. The new managing administration will be the French; this change signifies the ever-increasing importance with which the European railways regard the medium of the film for international and documentary purposes.

The International Railway Film Bureau (B.F.C.) and the International Railway Documentation Bureau (B.D.C.) become more closely linked with the Secretariat of the U.I.C., and this follows from the termination of the work of the special committee (exchange of documentation), set up when the Union's activities were revived after the war years with the primary object of inaugurating such permanent bureaux.

Each November the Board of Management, and the General Assembly, review the work of the several permanent committees dealing respectively with passenger and freight traffic, finance, accounts and statistics, operating, motive power and rolling stock, general studies, way and works and legal matters; but stress in recent years has perhaps been placed rather on the offices, centres and bureaux, and a fundamental change took place when the Board of Management was reduced in numbers some years ago and chairmen of committees ceased to be members of it.

The most important office is doubtless that for Research & Development (O.R.E.), under the aegis of the Netherlands Railways at Utrecht, while the central clearing house at Brussels, the information centre at Rome, and the documentation centre at Paris are other important activities. The U.I.C.'s sphere is very much wider and the board annually receives reports on the working of the International Railway Transport Committee (C.I.T.), European Goods Timetable Conference (L.I.M.), International Carriage & Brake Van Union (R.I.C.), International Wagon Union (R.I.V.) and the Union of European Railway Road Services (U.R.F.).

Amongst other successful developments to which the International Union of Railways can lay claim are the European wagon operating pool (EUROP), the Eurofima Company for financing new rolling stock construction, the Trans-Europ-Express organisation and the International Union of Railway Medical Services.

One who has played a great part in many of these organisations has been Monsieur Tribelhorn, Chief Traffic Officer of the Swiss Federal Railways, who has been Chairman of the R.I.V. and R.I.C. Unions and of the "Europ" committee. Having reached the retiring age his presence will be greatly missed at future international railway meetings, and the U.I.C. Board of Management recorded its best wishes for a long and happy retirement. The problems facing the U.I.C. in the coming years will be no easy ones, but, with Mr. Ratter as Chairman, and Monsieur Louis Armand as Secretary-General, one could hardly have a stronger team to find solutions for them.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

THE FUTURE OF THE RAILWAYS

December 17

SIR, I have read with interest some of the recent contributions in *The Railway Gazette* on the subject of the future of railways. Mr. F. C. Margetts's summing up of the trends in the North Eastern Region was particularly interesting, and indicative of the attitude within the railway industry which can still command an appreciative hearing.

Personally, I have the greatest admiration for railways and railwaymen; how could it be otherwise for a member of an engineering family, brought up in a railway age. Further, I take off my hat to that dogged optimism which refuses to admit defeat and as a result sometimes achieves the "impossible." However, I believe that there are times when, blinded by the sweat of desperate struggle, one tends to mistake the hand of the rescuer for that of the enemy. I believe that Mr. Margetts's attitude does just this. He starts his appraisal of the future prospects with the words, "leaving aside the extremes." He thus rejects the possibility that the situation is desperate enough to call for the surgeon's knife, rather than the physician's pill.

The proposals of the Railway Conversion League might certainly be regarded as surgery, but where surgery is the only answer the surgeon is the patient's best friend. After approaching the idea of railway conversion in a spirit of extreme scepticism I was forced to the conclusion that it was inevitable; but my association with the League over a period of three years has convinced me that there is a bright future for surface

transport in this country in which the railway organisation can play a basic part, if it will accept the surgery which is essential for its future health.

Yours faithfully,

M. J. DOUGLAS

Hallams Heath, Shamley Green, Guildford, Surrey

DEVELOPMENT OF THE PERSIAN RAILWAYS

December 19

SIR, I refer to the editorial article "The Development of the Persian Railways," in your December 9 issue. Having served in Persia as a Locomotive Running Officer with the Royal Engineers from January 1942 to April 1943, I am glad to see due credit given again to the British Sappers for their achievements before the arrival of the Americans.

ments before the arrival of the Americans.

I must comment on the statement that "the faster speeds over the single-track mountain sections were made possible by the diesels and particularly by their electric braking, and also by the use of air-braked and piped wagon stock." To start with, the whole of the line was single track throughout, and whilst I am not familiar with the section north of Teheran, I have full practical experience of the Ahwaz-Teheran section.

The advent of the diesels would certainly speed up the trains up the gradients, but any increase in speed downhill would be out of the question. When we arrived we found all the stock was fitted with Westinghouse brakes, and when British wagons arrived they were piped. We found that a restriction of 30 m.p.h. down hill was essential for safety, with very severe restrictions on the 11-ch horseshoe curves on the 1-in-65 gradient on the Andimeshk-Do Roud section.

You mention long waits by descending trains for the brake blocks to cool off. This is the first I have heard of it. We worked a variety of traffic including trains of 20 miles of submarine cable coiled over 10-12 "Warflat" wagons, and train-loads of rails and tanks. I believe that conditions north of Teheran, where the Russians had the 1-in-35 gradients, required special arrangements; but we never had trouble with heated brake blocks on our 1-in-65 gradients in normal train service.

You refer to timetable improvements whereby the loaded trains moved up from the ports by day, and the empties back at night. We found the opposite: on the section Ahwaz-Do Round, which included 132 miles with a ruling grade of 1 in 65, spiral tunnels, and 11-ch. horseshoe curves, the Persians worked the loaded trains up at night and the empties back by day. The summer temperature on the plains averages 130 deg. F. in the shade, and the heat reflected from the mountains was indescribable. The Persians thought us mad for working trains north from Ahwaz during the day in the summer.

Yours faithfully,

W. H. STANIER
Assistant to Line Traffic Officer (Motive Power)

British Railways, London Midland Region, Derby

LOCOMOTIVE LIFTING JACKS

December 28

SIR, We note with interest the paragraph on page 748 of your December 23 issue on the above subject.

We feel it would be of interest to your readers to know that we have recently concluded an agreement with the Joyce-Cridland Company of Dayton, Ohio, U.S.A., whereby we have been accorded sole rights to market in the United Kingdom the whole of Joyce-Cridland's range of industrial and railway jacks.

In addition to the exclusive agency in the U.K. we have authority to supply this range of jacks to many other countries throughout the world. The most interesting jacks from the railway viewpoint would be the "Yello-Jackit" range of air-motor jacks with capcapacities of 20, 35, 50, 75 and 100 tons, and toe-capacities of 10, 17½, 25 and 50 tons. These are all ball-bearing gearedscrew type air-motor driven from a 90 lb. per sq. in. air-supply.

The jack specially designed for diesel locomotive, passenger and freight-car work is the model "35 AHL," the light-alloy frame of which makes this one-third of the weight of other jacks of the same capacity. Mounted on three pneumatic-tyre wheels, it can readily be handled by one man and has a toe-capacity of 35 tons, with a rise of 4 ft. 4½ in. These jacks may be used singly or as synchronised units of two, three or four jacks. The jack incorporates many safety features and automatically locks under load in case of airfailure.

Yours faithfully.

B. W. F. CROFTS Technical Sales Manager

Cowans, Sheldon & Co. Ltd., St. Nicholas Works, Carlisle

TRANSFORMER TROUBLES

December 24

SIR, British manufacturers and British Railways would be well advised to remember that four of the other six countries in the "Outer Seven" free trade area have extensive systems of high voltage a.c. traction, albeit at $16\frac{2}{3}$ cycles.

As a result several companies, notably A.S.E.A. in Sweden and Brown-Boveri and Sécheron in Switzerland, have some 50 years of experience in building light, compact and non-explosive transformers rugged enough for use on railway vehicles.

If the British electrical companies do not make agreements with their continental rivals in order to share this valuable experience, British Railways may well be forced by commercial considerations of reliability and safety of service to buy in the wider Free Trade Area which will soon be open to them on competitive terms.

Yours faithfully,

JOHN RODGERS

132, Worrin Road, Shenfield, Essex

THE AMERICAN RAILROAD POSITION

December 17

SIR, The state of the American Railroads has not improved much since your November 11 issue reported its gloomy outlook. For 44 weeks to November 5, wagon-loadings were merely 123,780, or 0.5 per cent, above 1959. The one large increase was in ore movements; 740,890 more wagons passed, but that increase of 55 per cent was not reflected in the output of the steel plants, most of which worked at half capacity. There was little change in coal forwardings, though 27,760 more wagons of coke were loaded, a rise of 8 per cent. Grain loads were 9,895 over 1959, but 105,500 fewer than in the record year 1958. The troubled condition of the national economy is shown by a fall of 346,200, or 2.5 per cent, in loads of general merchandise. The volume of less-than-wagon-load traffic declined by 250,650 loads, or 13.7 per cent, to the meagre total of 1,576,650.

On November 1, the railroads had 148,640 wagons under repair, nearly 9 per cent of total stock. They were left with 1,517,270 serviceable wagons, a loss of 36,090 from the 1959 figure. The Association of American Railroads was able to meet all demands for wagons and is suspending the publication of monthly reports on the transport situation while the present low level of traffic persists.

Yours faithfully, YOUR CORRESPONDENT

Westminster, S.W.1.

The Scrap Heap

British railway centenaries of 1961

Below is a list of British railway centenaries which occur during 1961:—
February 1. Markinch to Leslie opened (44 miles). Leslie Railway.

February 1. Countess Park to Thorneyburn opened (7½ miles). North British Railway—Border Counties Section.

February 14. Shrewsbury to Minsterley opened (91 miles). Shrewsbury & Welshpool Railway.

March 6. Bucknell to Knighton opened (4 miles). Knighton Railway. Previously used for mineral traffic.

March 12. Castle Douglas to Stranraer opened (53½ miles). Portpatrick Railway.

March 14. Paignton to Brixham Road (Churston) opened for passengers (3 miles); goods April 1. Dartmouth & Torbay Railway.

April 1. Kildale to Castleton opened (6 miles). North Yorkshire & Cleveland Line (North Eastern Railway).

May 1. Exeter to Exmouth opened (9½ miles). Exeter & Exmouth Railway (L.S.W.R.).

June 10. Lochee Deviation, Ninewells Junction to Fairmuir Junction opened (4½ miles). Dundee & Newtyle Railway.

June 10. Welshpool to Newtown opened (13¾ miles). Oswestry & Newtown Railway.

June 10. Coalport Branch opened (8\)\text{miles}. London & North Western Railway.

July 1. Halstead to Castle Hedingham opened (3½ miles). Colne Valley & Halstead Railway.

July 1. Shoreham to Partridge Green opened (9³/₄ miles). London, Brighton & South Coast Railway.

July 13. Whitstable to Herne Bay opened (3¹/₄ miles). Margate Railway (London, Chatham & Dover Railway).

July 18. Dyce to Mintlaw opened (29 miles). Formartine & Buchan

July 22. Canterbury to Dover Priory opened (15½ miles). London, Chatham & Dover Railway.

August 1. Woofferton to Tenbury opened (5 miles). Tenbury Railway.

August 8. Barnard Castle to Tebay opened (34½ miles); mineral traffic had been carried between Barnard Castle and Barras (16 miles) from March 26 and throughout from July 4. South Durham & Lancashire Union Railway.

August 10. Bridgend to Duffryn Llynvi, Tywith (10 miles), and Tondu to Porthcawl Harbour opened (9\frac{1}{4}\text{ miles}), both 7 ft. gauge. Llynvi Valley Railway.

August 12. Meigle to Alyth opened (51 miles). Alyth Railway.

August 19. Redcar to Saltburn opened (6½ miles). Stockton & Darlington Railway.

August 24. Ingleton to Low Gill opened (18 miles) for goods; passengers September 16. London & North Western Railway. August 26. Guide Bridge Junction to Oldham opened (6 miles) for passengers; goods, February 1, 1863. Oldham, Ashton & Guide Bridge Junction Railway.

August 26. Granton branches opened (3\frac{3}{4}\text{ miles}) for goods; passengers 1879. Caledonian Railway.

September 2. Thorneyburn to Falstone opened (3½ miles). North British Railway.

September 13. Malvern Wells to Shelwick Junction (with Shrewsbury & Hereford Railway) opened (18 miles). West Midland Railway.

September 16. Partridge Green to Horsham (Itchingfield Green) opened (7 miles). London, Brighton & South Coast Railway.

October 29. Carlisle to Scotch Dyke opened (10½ miles). North British Railway.

November 1. Dover Priory to Dover Harbour opened (1 mile). London, Chatham & Dover Railway.

November 14. Yarnton to Witney opened (8½ miles). Witney Railway. December 1. Ruabon, Llangollen Line Junction to Llangollen opened for goods (5½ miles); passengers June 2, 1862. Vale of Llangollen Railway.

December 2. Longtown to Gretna opened (31 miles). North British Railway.

Ode to an off-white paper

I'm accountability conscious,
Said the railway board to the bus.
You'll pay if you enter the station yard;
And make no marplesian fuss.

Then London Transport retorted, You wait till you get in a jam: We shan't like the look of your tickets Or give a marplesian damn.

We're not at home to the railways, Said the British Transport Docks; Any vessel that's flying a railway flag Will be wrecked on marplesian rocks.

Hoteliers joined in the chorus: We're freed from the B.T.C. And our guests who travel by railway Will be charged a marplesian fee.

Independence and not integration,
Came the cry of the B.R.S.
What you choose to do with roadrailers
Is just a marplesian guess.

But later they said on reflection,
We're bound for the bankruptcy court
If only the cars and the R.H.A.
Get all the marplesian support.

OLD FORD STATION



Photo]

Old Ford Station on the Dalston junction to Poplar line of the former North
London Railway, closed in 1944 and now used as a warehouse

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

NEW ZEALAND

Railway construction halted

In accordance with its pre-election pledge, the National Government, which came into office on November .26, has ordered a stop to work on the Nelson-Blenheim railway line. Work on the project was begun by the defeated Labour Government after a bitter debate in the House of Representatives early last year. In announcing the stoppage of work on the scheme, the Prime Minister, Mr. Holyoake, said that in the opinion of the new Government construction of the railway was not economically justified at the present time. The Labour Government estimated that the project would cost between £10 million and £10.5 million. The Opposition estimated the cost as high as £16 million.

AUSTRALIA

Rolling stock production

The Commonwealth Department of Trade recently published the results of a survey covering the twelve months to March 31, 1960, showing that 10 main line and 33 branch line diesel-electric locomotives were produced in Australia. Additionally, an unspecified number of steam, diesel-hydraulic and diesel-mechanical locomotives for railways and

industrial plants were built in the Commonwealth. Some 36 railcars and motor coaches were also turned out, mostly from railway workshops, as well as about 90 passenger coaches mainly built by contracting firms. A considerable volume of goods stock was also locally produced. Altogether the rate of production of all rolling stock was estimated at about 10 per cent higher than in the year ended March 31, 1959.

Exports and imports of stock

Imports of locomotives and other rail-way components during 1958-59 were estimated to cost £A.3,200,000, whereas rolling stock exports during that year were valued at £A.2,100,000, of which £A.1,300,000 were accounted for by the supply by two firms of 2,000 goods wagons to Indian Railways under the Colombo Plan.

VICTORIA

"Spirit of progress" timing

The necessity to stop at Wangaratta, Benalla and Euroa on the journey to and from Albury is regularly preventing "Spirit of Progress" from arriving on time. The Minister of Transport, Sir Arthur Warner, explained recently that because of the limitation of hours of work imposed by the railway unions, the

diesel rail-car that normally ran in each direction between Melbourne and Wangaratta was cancelled on March 15, 1960, to conserve man hours. Since then, "Spirit of Progress" had stopped at Wangaratta, Benalla and Euroa on the trip to and from Albury to provide a service for residents of those districts. The train was still required to maintain normal arrival times at Melbourne and Albury. Time lost ranged from eight to 12 min. depending on the tonnage of the train. Standard gauge works also result in speed reduction.

Express live-stock transport

A new era for live-stock transport is to be inaugurated by the Victorian Railways with the introduction of sheep wagons capable of travelling at up to 70 m.p.h. High-speed bogies similar to those already used under goods wagons on the "Fruit Flier" are being fitted to 10 standard "LL" type sheep wagons. When ready for traffic these wagons will be available initially for use on the "Fruit Flier," enabling stock raisers to load their sheep on the rail on Monday with the assurance that they will arrive in top class condition for the Tuesday sales.

IRELAND

Motive power performance tests

Speed tests on the Dublin-Belfast. Dublin-Cork, and Dublin-Galway lines of Coras Iompair Eireann are being carried out with a view to establishing the best possible performance by various combinations of diesel power units and intermediate trailers. A trial was carried out recently with a train consisting of four power vehicles and one trailer. This combination, more highly powered than the diesel trains as usually composed, ran from Dublin to Cork, 165 miles, in 2 hr. 33 min. The tests are being made with a view to providing suitable combinations to ensure reliability of performance with maximum comfort. The speed limit of 70 m.p.h. has not been exceeded.

UNITED STATES

Aluminium gondola wagon

A covered gondola wagon with an allaluminium body 85 ft. long has been developed for weatherproof shipment of long loads, such as structural shapes.

The experimental unit was developed by Harvey Aluminium in co-operation with the Chicago Rock Island & Pacific Railroad and the North American Car Corporation. A successful coast-to-

ELECTRIC AND STEAM TRACTION IN RUSSIA



Class "N8" Bo.Bo + Bo.Bo electric locomotive in double traction with a 2-10-0 steam locomotive Class "L," on U.S.S.R. Railways

coast run has already been completed. The all-aluminium body is composed of six aluminium extrusions 82 ft. long and 25 in. wide. Three of these channel sections are stacked longitudinally and mechanically joined to form each side. For the roof, panel-type aluminium extrusions were fabricated into four 20-ft. sections. Tare weight of the complete wagon is 75,900 lb. Weight of the aluminium superstructure is under 10,000 lb. Maximum load is 134,100 lb., and the capacity is 3,240 cu. ft.

SWITZERLAND

Quick signalbox replacement

On November 21, 1960, a derailment caused by track reconditioning occurred at the approach to Lucerne terminus station. A derailed vehicle completely smashed the remote controlled signalbox at Fluhmühle junction. This junction handles the traffic on the double line from Basle and from Berne over the single line through the Gütsch tunnel to

Lucerne. A new interlocking scheme was ordered with the contractors, Integra A.G., on November 25 and the signalbox was manufactured, installed and tested within three weeks. It has been in normal operation since December 21. This quick replacement of a signalling plant was possible because it was designed to geographical circuit technique with domino packaged circuits.

New rolling stock

The Brigue-Viége-Zermatt Railway has recently invested some 4,000,000 Swiss francs in new rolling stock, such as four express train coaches and two specially designed twin railcars with 92 passenger seats in each.

ITALY

Strike action

A 24-hour railway strike called by the Railwaymen's Union affiliated to the Communist-dominated General Confederation of Labour was staged on December 28. Main-line services were kept going, even though on a reduced scale, by railwaymen belonging to other unions and by the Army Transport Corps. Local services were at a standstill.

"Train-auto" service

The "train-auto" service of selfdrive motorcars for passengers at principal stations has proved so successful during its first two years that it is to be extended. Tariffs are reduced for the winter period from November to April, and newer makes of cars, are being made available.

WESTERN GERMANY

Electronic seat reservation

The German Federal Railway is preparing an electronic booking-system for the reservation of seats in passenger trains. A similar arrangement was made in 1959 for bookings of automobiles using the Grossenbrode-Gjedser ferry, which was very satisfactory.

PUBLICATIONS RECEIVED

Railwayman, By Christopher Vincent. London: Lutterworth Press, 4, Bouverie Street, E.C.4. 10 in. by 8 in. 76 pp. Illustrated. Price, 10s. 6d. One of a series describing the work of various callings, this book outlines the growth of railways from the beginning, and many aspects of railway activity, recent developments such as the introduction of diesel traction, and the modernisation of British Railways, mainly in photographic illustrations. There are brief descriptions of training schemes for apprentices and other entrants to the railway service in Britain. A short section is devoted to overseas Most of the illustrations, railways. which are well chosen and reproduced, were obtained from the British Transport Commission, British Railways, and railways abroad. Despite some inaccuracies, the book will help those contemplating a railway career.

The Benguela Railway. The services provided by the Benguela Railway, are described in an illustrated booklet, the subject of editorial comment on page 3. Particulars are given of the port facilities at Lobito; the areas served; ancillary activities, including the Hotel Terminus at Lobito, owned by the company, and the many medical and social services provided for employees; rail and road passenger facilities, both within Angola and for transit traffic; and goods services, with indications of traffic carried and tables of distances from Europe and North America to some principal destinations via Lobito and other African ports. Reference is made in brief notes to the motive power and rolling stock, nearly all British built. The 101 steam locomotives include 48 4-8-2 + 2-8-4 Beyer-Garratts and 34 North British 4-8-2s and 4-8-0s. Many aspects of the railway's activities are shown in photographic illustrations. Copies may be obtained from the London office of the Benguela Railway Company, 95 Gresham Street, E.C.2.

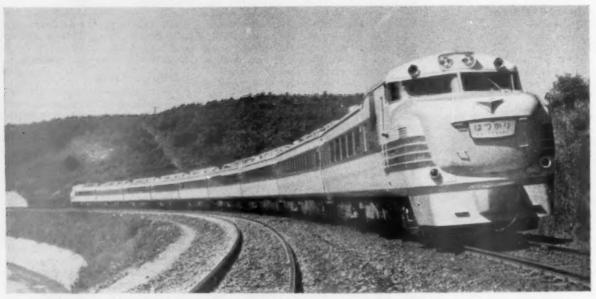
Solus-Schall Non-Destructive Testing. A booklet illustrated with photographs and diagrams, issued by Solus-Schall Limited reviews the site methods of non-destructive testing provided by the firm. These include visual welding inspection, X-radiography, gamma radiography, penetrants, ultrasonic flaw detection, and magnetic particle inspection. Each of these methods is described. An application of ultrasonic flaw detection illustrated is locomotive boiler examination on the Rhodesia Railways, and brief reference is made to flaw detection in rails and axles. Copies are obtainable from Solus-Schall Limited, County Building, Honeypot Lane, Stanmore, Middlesex.

Summary of Annual Reports of Traffic Commissioners, 1959-60. Published by H.M. Stationery Office. Price 3s. A summary of the annual reports for the year ended March 31, 1960, of the Traffic Commissioners for the 11 Traffic Areas of Great Britain outlines developments in public road passenger transport. The few applications for major increases in fares were made by larger operators mainly to counter the cost of wage awards. Declines were reported in bus traffic, but the pattern, as regards trends in

urban and rural areas, varied, as did the success of the efforts by operators to maintain services in view of falls in traffic. In the Yorkshire Traffic Area express carriage services between large centres were affected by introduction by British Railways of new and more frequent diesel trains, mostly those of the North Eastern Region. Despite the growing competition from Southern Region electric trains, and the increased use of private transport, few bus services had to be withdrawn in the South Eastern Area.

Holidaymaking, 1961. The Holiday programme of Thos. Cook & Son Ltd. and Dean & Dawson Limited, illustrated in colour and half-tone, affords a wide Many places are included for the first time, notably Royan, on the Bay of Biscay; Sunium, in Greece; and seaside resorts in Portugal, Italy, Norway, and Sweden. The U.S.S.R., Morocco, Tripoli, the Canary Islands, Canada, and the U.S.A. afford opportunities for conveniently arranged holidays at minimum prices. Nearer home there is the usual variety of environment in Western, Central, and Northern Europe. The programme is the subject of editorial comment on page 3.

Middlesex Pre-fabricated Buildings. A leaflet, No. 6 in the "Progress in Pre-fabrication" series of J. E. Lesser & Sons Ltd., of Green Lane, Hounslow, Middx., describes cedar cladding of the exterior of office buildings pre-fabricated on the Middlesex system. Details also are given of interior finishes for such structures.



Nine-car diesel-hydraulic multiple-unit train " Hatsukari"

DIESEL-HYDRAULIC TRAINS for Japanese National Railways

Express de-luxe nine-car air-conditioned units with multi-engined equipments

THE LARGE fleet of diesel railcar units operated by the Japanese National Railways has been augmented by the introduction of two de-luxe diesel-hydraulic express trains to replace the steamhauled "Hatsukari" limited express daily service operated between Tokyo and Aomori. The latter place is the southern

terminal of the ferry service linking the islands of Honshu and Hokkaido.

The trains are designed to provide an express long-distance service with a high standard of comfort for passengers. Each train is of nine-car formation, of which eight are power cars and one, the restaurant car, is a trailer. The train make-up

Interior of second class saloon

consists of one driving power car (second class) Type M₂C, two power cars (first class) Type M₁, one trailer (restaurant car) Type T_D, four power cars (second class) Type M₂, and one driving power car (second class) Type M₂C.

Construction of the coaches has been entrusted to nine manufacturers, to enable each of them to gain experience in the building of this type of rolling-stock.

Traction engines

The train is powered by 14 engines of the Japanese National Railways standard railcar type, rated at 180 h.p., giving a total output of 2,520 h.p. for traction. The supply of these engines has been shared by three engine manufacturers. Power for auxiliary services is provided by three diesel-alternator sets of 125kVA. each, of which two are in use under normal conditions.

Principal dimensions and data are as follow:—

Name and Address of the Address of t					
Maximum service speed				***	69 m.p.h.
Balancing speed on 1 in 100 grade					52 m.p.h.
Weight of train-tare					366 tons
Maximum length	ofe	oache	5		
Driving coach					69 ft. 101 in.
Non-driving coaches and trailer					69 ft. 21 in.
Maximum width					9 ft. 6 in.
Maximum heigh	E	***	440		12 ft. 10 in.
Bogie centres					47 ft. 25 in.
Bogie wheelbase					6 ft. 101 in.
Total length of t	rain				623 ft.
Seating capacity	land.				
First-class					96
Second-class .					368
Total					464

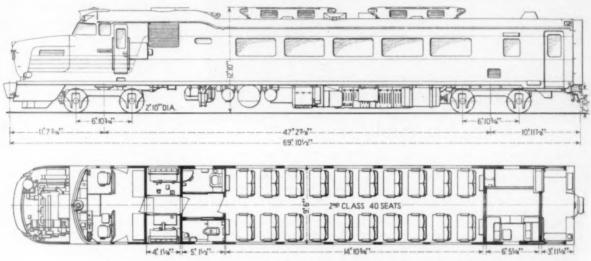
Passenger accommodation in both classes is of the open-saloon type, the seats being arranged in pairs on each side of the central gangway. The seats can be turned to face either direction, those in the first-class coaches having, in addition, adjustable reclining backs.

The exterior colour-scheme of the coaches is yellow, relieved by a narrow red band along the lower edge of the

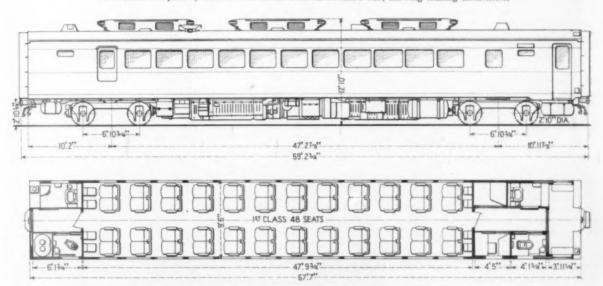
body and a red band extending the length and width of the windowed portion of the body sides. The nose of each driving coach is fitted with a name-board surrounded by a polished metal frame inscribed with the name of the train, "Hatsukari," in Japanese and in roman characters. The roofs and undercar equipment are painted grey, and the bogie equipment is painted black.

Each driving power car has a nose-end, forming a housing for one of the auxiliary diesel-alternator sets. The housing is hinged near the cab and can be raised to allow access to the diesel-alternator for maintenance purposes. Behind the nose end is located the driver's cab in an elevated position, with wide windows extended round to the cab sides to give a good range of vision. The exhaust pipe

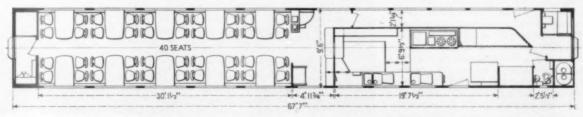
from the auxiliary engine is led to the cab roof, enclosed in a casing between the cab front windows. Access to the cab is by a door on each side, behind the driver's and assistant's seats. Separated from the cab by a bulkhead is a compartment containing radiators for the engines and other auxiliary equipment. A further partition divides this compartment from two toilet compartments, and beyond



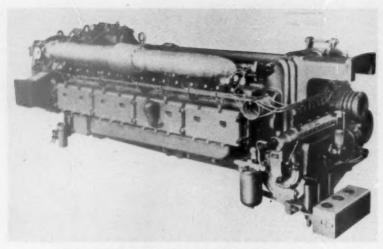
Elevation and plan of second class coach with motorman's cab, showing leading dimensions



Elevation and plan of first class coach, showing underframe mounting of twin power units



Plan of dining car, showing arrangement of seating and layout of kitchen



Eight-cylinder diesel engine and hydraulic torque converter

these is a 40-seat second-class passenger saloon. At the end of the coach remote from the cab a small kiosk is provided for the convenience of the passengers. Doors at this end of the coach give access to the passenger accommodation. Each second-class intermediate coach consists of a single passenger saloon with toilet compartments and entrance vestibule at one end only. The first-class coaches are similarly arranged with an entrance vestibule at one end, but are equipped with toilet compartments at both ends.

The restaurant car consists of a dining saloon and a kitchen. The saloon has 10 tables, providing seating for 40 people.

Gangway connections allow communication throughout the length of the train, and, in addition, flexible sheets are attached to the ends of the coaches, round the outer edge, enclosing the spaces between them.

Air conditioning

All coaches are air-conditioned, the temperature being adjusted to suit the prevailing conditions. In winter, the air is warmed by electric heaters installed beneath the seats. In conjunction with the air-conditioning system, all windows in the passenger accommodation are of the fixed, double-glazed type. The floors are covered with vinyl, which is laid on a foundation of "Moltopren," a light and non-flammable substance with heatinsulating and sound-proofing properties.

The seats in the second-class coaches are in pairs, capable of being rotated to face either direction, and a small flap table is attached to the back of each seat. The first-class seats, in addition to being rotatable, can be adjusted for inclination in any one of three positions, with movable head-rests to suit the various reclining positions. Each seat is provided with a detachable table, an ashtray, and a radio ear-phone. The latter enables passengers to listen to programmes transmitted by the Japanese Broadcasting

Corporation and picked up by a receiver on the train. A public-address system is also installed throughout the train; this and the radio equipment are controlled from the conductor's compartment.

Liggage racks extend throughout the length of the passenger saloons above the windows. A light two-tone colour scheme is adopted for both classes of accommodation, and fluorescent lighting, covered by diffusion panels, is arranged in the form of two continuous strips along the roof of each saloon. Glazed swing-doors give access to the saloons, while the entrance doors to the train are of the sliding pattern, operated by the conductor.

Dining-saloon décor

The interior of the dining-saloon is finished with "hard-board" (fibre surfaced with polyester) and a two-tone colour scheme of brown for the walls and light-grey for the ceiling has been chosen. Curtains of blue material and metalframed chairs with red plastic-covered seats and backs complete the scheme of decoration. As in the passenger coaches, the lighting is of the continuous-strip fluorescent type. Special features of the dining-saloon equipment include a tape-

recorder to provide musical accompaniment to the service of meals, and a trainlocation indicator, an electrical device giving a continuous indication of the position of the train on its journey. All the equipment in the kitchen is electrically-operated. A group of four water tanks is located below the underframe of the restaurant car to supply the requirements of the kitchen.

Stand-by diesel-alternator

Also mounted on the underframe of this coach is the third diesel-alternator set, which normally acts as a stand-by for the other two sets on the train, but is also intended to provide additional generating capacity in the event of the train being lengthened by two or more coaches.

The 14 main engines for traction are of the standard type "DMH17H," continuously rated at 180 h.p. at 1,500 r.p.m. They are water-cooled, four-cycle, horizontal engines, comprising eight cylinders in line, with pre-combustion chambers. The cylinder dimensions are 130 mm dia. and 160 mm stroke. Fuel is supplied to the injectors by a monobloc pump, driven from the free end of the engine.

Torque converter

Direct coupled to the engine is a hydraulic torque converter of the Lysholm-Smith type, and the combined engineconverter unit is mounted below the power car underframe on brackets. The drive from the converter is taken to the axles via a propeller shaft and a combined reduction and reversing gear unit. Each engine drives the inner axle of the adjacent bogie. Each of the intermediate power cars is equipped with two engines, while each driving power car has one engine only, driving the inner axle of the bogie remote from the cab. The engine cooling system incorporates a thermostatically-controlled bypass system.

Each of the three auxiliary dieselalternator sets consists of a standard type "DMH17H-G" engine, rated at 150 h.p. at 1,200 r.p.m., direct-coupled to a threephase, 60-cycle alternator, having an



Driving bogie, showing combined reduction and reversing gearbox on inner axle

output of 125 kVA. at 440 V. The engines are of the four-cycle, horizontal type, with eight cylinders in line. The auxiliary equipment supplied by these sets include the unit-coolers in the airconditioning system, electric train heaters, fluorescent lighting in the passenger accommodation, and the kitchen equipment.

The rated output of the auxiliary engines is developed at a cylinder brake mean effective pressure which is about 4 per cent greater than that of the main engines at full power and speed. By using the same basic design of engine for both main and auxiliary duties, the stocking and ordering of spare parts is somewhat simplified.

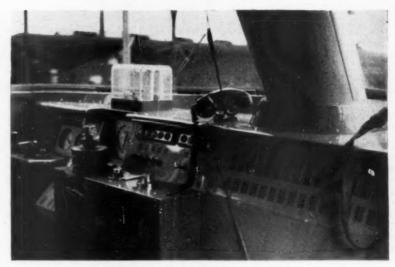
Control gear

The control gear operates on 100-V. d.c., fed through a rectifier from the a.c. system. Engine starting is by a separate 24-V. system, from a battery charged by an engine-driven dynamo.

All main engine and traction equipment operations are regulated by electromagnetic and electro-pneumatic control gear, actuated from either cab by a multiple - unit control system. driver's control position is on the left hand side of the cab, comprising power and brake controllers, and an inclined panel carrying instruments, gauges, switches, and indicator lights. The functions of the latter include indication of hydraulic pressure, movements of the reversing gear, converter, and direct coupling of the torque converter, and the opening and closing of the side doors. A speedometer and air-brake pressure gauge are fitted.

Brake equipment

The brake system is of the electropneumatic type, supplied by compressors, which are belt-driven from the free end



Motorman's cab, showing intercom handset

of the engines, and controlled by pressureregulators.

The bogie frames are of fabricated pressed-steel plate construction, equipped with bolsters, and are H-shaped, without end beams. Side-bearers are arranged to carry 30 per cent of the weight on the bogie. A departure from previous Japanese railcar practice consists of the adoption of air-springs and anti-rolling devices in place of the normal bolster coil springs. Shock-absorbing rubber is used in conjunction with the axlebox coil springs, and on sliding surfaces, such as axlebox and bolster guides, antifriction resin is used. The axles, which are hollow, are carried in double-row, cylindrical roller bearings, augmented by ball bearings and rubber cushioning to take side-thrust. Wheels are of the solid rolled type and are 33.8 in. dia.

The assembly of the car body and underframe is carried out in fabricated,

light-weight steel construction. Couplers are of the small, tight-locked, automatic type fitted with a rubber buffer device.

The nine rolling-stock manufacturers are as follow:—

Coach Type M2C

Coach Type M2

Coach Type M3

Other contractors include the following:—

Diesel engines

Nijgata Engineering Co. Ltd.
Shinko Engineering Co. Ltd.
Daihatsu Kogyo K. K.
Nijgata Converter Manufacturing Co. Ltd.
Shinko Engineering Co. Ltd.

The complete order for the "Hatsukari" electric train service consists of two complete nine-car train sets and six spare coaches.

PAKISTANI TRANSPORT MERGER

As a result of negotiations between the Central Government of Pakistan, the Government of East Pakistan, the Rivers Steam Navigation Company, and the India General Navigation & Railway Company, arrangements have now been made for the transfer to a new company, incorporated in Pakistan, of the fleets and other assets in East Pakistan of the two sterling inland shipping companies, together with those of the Governmentowned Eastern Bengal Railway flotilla. The new company, known as the Pakistan River Steamers, commenced operations on January 1. It has an authorised capital of Rs. 10 crores (£7.5 million).



Interior of dining car

AIR-CONDITIONING on the "Mistral"

Experience gained under the severe conditions imposed by a daily run of about 1,100 km. at record speed

It is not intended in this article to recapitulate the known characteristics and qualities of a high-speed train, the prestige of which is still intact after more than four years' service. The intention is essentially to record the experience gained with an air-conditioning installation which has been submitted to a select clientele and subjected to the especially severe operations conditions involved in making a daily run of about 1,100 km. at record speed.

It is necessary at the outset to refer to certain characteristics of the "Mistral." It comprises 10 or 12 first-class coaches, a refreshment car, a Pullman car and two restaurant cars.

This very fast and heavy train (usually of 15 bogie vehicles) operates at the following schedule speeds:—

128 km.p.h., Paris to Lyons (512 km.);

121.6 km.p.h., Paris to Avignon (742 km.);

115.3 km.p.h., Paris to Marseilles (863 km.);

103.6 km.p.h., Paris to Nice (1,088 km.).

The train is divided at Lyons and at

Marseilles and re-formed at the terminal stations, Paris and Nice, with the object of so positioning the special vehicles as to facilitate service to the greatest possible extent.

The train is at present electrically hauled between Paris and Avignon, at a maximum permitted speed of 150 km.p.h. on certain sections of the line, and is steam hauled over the remainder of the route at maximum speeds of 120 km.p.h. between Avignon and Marseilles and 100 km.p.h. between Marseilles and Nice.

Stone Carrier apparatus

The air-conditioning apparatus is of Stone Carrier manufacture. This make of equipment, already widely used in a number of countries, had given complete satisfaction on two refreshment cars over two years before a completely air-conditioned train was put in service on August 1, 1956.

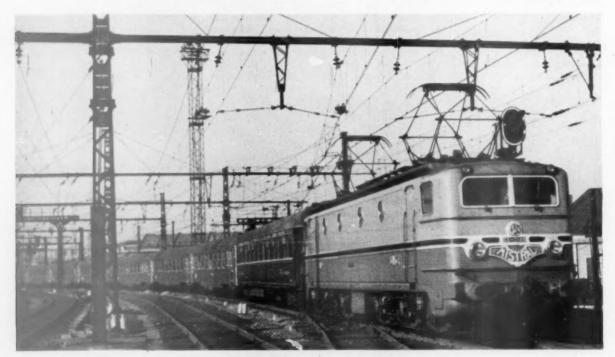
The one notable point of difference is the supply of electrical energy for the heating and cooling associated with the air-conditioning, lighting and auxiliary services, such as control circuits and water heating, for which the original refreshment cars were each provided with a 23/27 kW. axle-driven generator.

The use of this method of generation for a train of 15 vehicles would have imposed an addition to the traction load which would have been unacceptable in the conditions under which "The Mistral" is hauled, and accordingly it was rejected.

It was decided and accepted that, granted the limitation of a certain number of vehicles to one definite service, a generator van could provide for the power requirements of the whole train.

In comparable cases, this solution has the following advantages:—

- (i) A saving in weight of the order of three tonnes per coach by the elimination of the axle-driven generator and the battery, the addition to the tare weight due to the air-conditioning apparatus being reduced from six tonnes, for the self-contained equipment used on the first refreshment cars, to about three tonnes in the case of the present vehicles supplied from a generator van.
- (ii) The use of generating sets accommodated in a van simplifies the pre-



The "Mistral" leaving Gare de Lyon, Paris

conditioning operations and saves the fixed installations which would be required for vehicles equipped as were the prototype refreshment cars.

(iii) With diesel generating sets using an economical fuel (domestic fuel oil), the cost per kWh. (or per calory) at the point of utilisation is from 50 per cent to 65 per cent less than when the energy is obtained from the tractor unit through the axles and axle-driven generators.

The general arrangement adopted may be summarised as follows:-

A 600-V., 3-phase, 50-cycle generating set is installed in a van.

A train line, installed under the vehicles, distributes the current along the length of the train.

SECTION A.A

22 Toilet compartment 23 Apparatus box

On each vehicle a transformer reduces the voltage to 220 V. for the air-conditioning and lighting circuits.

Coach equipment

The 600-V. 50-cycle distribution circuit is completed between vehicles by sixcore jumper cables terminated in plugs and couplers, of Khéops manufacture, specially designed and developed for this application. Coupling and uncoupling is very easily performed in two stages by an operating lever.

The train line is duplicated and is installed under the vehicles. It comprises three power cores of 75 sq.mm. cross section and three control cores of 10 sq.mm. cross section.

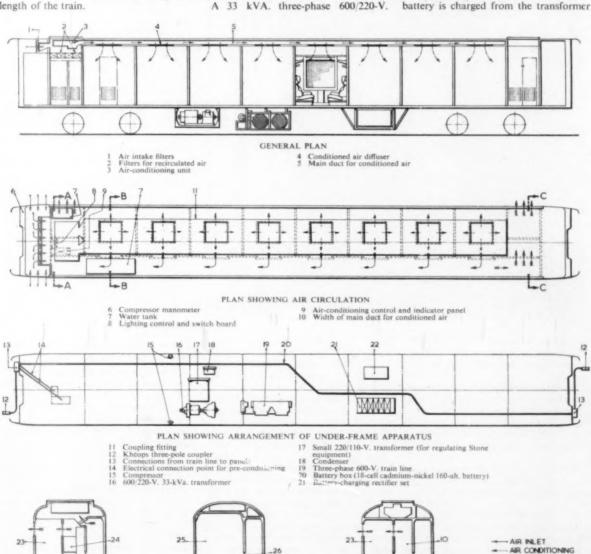
50-cycle transformer is suspended from the underframe.

The maximum power requirements of an "A8" myfi coach, including lighting and auxiliaries, are about 27kW, when heating and 17kW, when refrigerating,

All the equipment-motors, floor radiators, and fluorescent lighting-is surplied at 220 V. from the secondary of the transformer. This equipment can therefore be of standard commercial production.

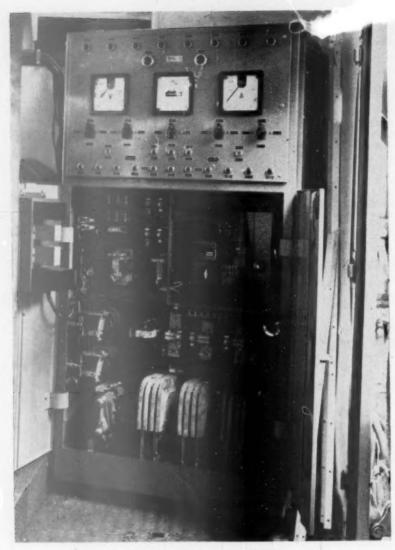
Auxiliary lighting from 24-V. incandescent filament lamps, fed from a conventional 18-cell nickel-cadmium 160-Ah. coach battery, is automatically switched on in the event of accidental or intentional interruption of the train line. The battery is charged from the transformer

- AIR RETURN



SECTION C.C 26 Toilet

SECTION B. B.



Control cubicle for baggage-car generator

on the coach through a metal-oxide rectifier.

The pre-conditioning, lighting, and other circuits of any isolated vehicle can be fed either from a 600-V. supply through the end couplings or from a 220-V. supply through special sockets fixed each side on the sole bars.

The diagrams show the general arrangement of the apparatus and the air circulation of the conditioning system.

Air circulation

After re-heating or re-cooling in the conditioning unit C, the air passes into the roof sheathing E and thence into the compartments via multi-vent panels fixed to the ceiling. Part of the air is eliminated to the exterior of the coach and the remainder is drawn into the corridor and returns to the conditioning unit where it mixes with air from outside the coach.

During cold weather, supplementary heating is provided by electric radiators at floor level.

In all the coaches, the equipment changes automatically from heating to plain ventilation or to refrigeration according to the thermal requirements of the interior, through the action of an automatic temperature control comprising mercury contact thermometers, manufactured by the Vapor International Corporation, which regulate the whole coach through the medium of the average temperature of the re-circulated air.

A heating switch and a refrigeration switch, located on the Stone control panel, each give a choice of three temperature levels, namely:—

20 deg. C., 21·1 deg. C., or 22·2 deg. C. when heating;

22-2 deg. C., 23-9 deg. C., or 25-6 deg. C. when cooling.

This arrangement is reasonable, for it

is recognised that the comfort temperature must increase with increasing outside temperature, if only to spare the traveller the unpleasant and dangerous results of a difference of more than 7 deg. or 8 deg. C. between the outside hot weather temperature and the temperature of a cooled interior.

Generator van equipment

The general arrangement of the generator van is shown in Fig. 4 and includes:—

Generator compartment with its control and regulation panel and its accessories.

Luggage compartment;

Service compartment.

The portion of the roof which is above the engines is removable to facilitate the installation and removal of the component machines.

The side walls, including the sbutters of the inlets for the combustion air, are heavily insulated to limit the transmission of engine noise to the outside of the vehicle.

The generating set comprises an alternator mounted between two diesel engines, all on a common centreline on one rigid baseplate, the alternator being coupled to each engine through a friction clutch.

The diesel engines are of the Poyaud type, eight cylinders arranged in 450V., supercharged, 150-mm. bore, 180-mm. stroke, 1,500 r.p.m. nominal, one-hr. rating 400 h.p. The turbo blower is the Brown-Boveri type VTR200.

The alternator is of the Gramme type, self-ventilated, 600-V. 3-phase 50 cycles, power factor 0.8, speed 1,500 r.p.m., rating 520 kVA.

The clutches are of the Twin-Disc type. They are operated either by the intermediary of electro-pneumatic valves or, in emergency, manually.

The control operations, comprising the following:—

Starting-up of either engine;

Connection of the alternator to the distribution circuits:

Voltage, current, and frequency regulation;

are carried out, in the main, by electronic equipment housed in a cubicle and manufactured by the Société C.E.B.I.

According to the power requirements of the train, which depend on the train formation and the atmospheric conditions either one or both diesel engines are started up and automatically coupled to the alternator.

After some initial difficulties with the generating plant, the air-conditioning system has given very satisfactory results.

It not infrequently happens that a variation of outside temperature of the order of 10 deg. C. is experienced between the regions through which The

Continued on page 20

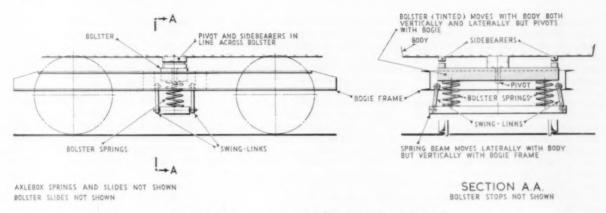


Fig. 1-Diagram of the widely-used swing-bolster type of bogie

OBTAINING A SMOOTH-RUNNING BOGIE-1

Improving the conventional type as used on multiple-unit and locomotive-hauled stock by a basic approach to its faults

BY A CORRESPONDENT

Many railwaymen believe that, because a railway coach uses a steel wheel running on a steel rail, it is fundamentally impossible to obtain a really smooth, vibration-free ride. Others believe that good riding can ultimately be attained, but only after difficult and lengthy research work.

It would appear that both viewpoints are wrong. The fundamental requirements for good riding were first published at least five years ago, for their success in everyday service had already proved their sound foundations.

Further research unnecessary

This knowledge, coupled with consideration of the basic laws of mechanics, enables it to be said with confidence that the design and quantity production of a superb-riding bogie should be possible without further research, though, like any other piece of new equipment, it would doubtless require slight modification during development and proving trials.

In this article it is proposed to consider the main design features essential to a smooth-riding bogie and to touch on other factors concerning the riding qualities of passenger vehicles. No criticism of past work and methods is intended; the sole object is to facilitate future improvements.

The function of a bogie is best visualised as being to carry the coach body along a perfectly-aligned straight or curved path with the absolute minimum of deviations or noise due to imperfections of the track, and other causes.

Assuming no shocks from other items such as drawgear, only unwanted forces from the bogies can disturb the natural tendency of the vehicle body to glide smoothly along the perfect path. Thus the bogie suspension system should be able to accommodate the largest variations found between the ideal path of the body and the track; at the same time, it must support the body with an almost unvarying upward force if disturbances are not to be felt.

Fig. 1 shows the bogic under consideration in diagrammatic form; it is of the widely-used swing-bolster type. Only the main parts are shown.

Elementary principles

The principles involved in springing can be demonstrated by holding in the hand an ordinary elastic band with a compact weight tied to the other end. The weight should be enough to stretch the band to about double its normal length—two standard $\frac{3}{4}$ -in. nuts will probably suit. It will be found that quick but not too large vertical movements of the top end of the band will hardly move the weight at all. Should two such elastic bands be used to support the single weight, the same movements will have a greater effect.

Each end of the bolster is suspended from the bogie frame in a similar manner, though as will be seen from Fig. 1, the swing links are solid and do not stretch like the elastic band, separate springs being used instead. Clearly, the springs should be soft, not only so that rapid changes in their length have the least effect on the body, but also to ensure that any unavoidable body movement, as shown by the elastic band and weight, can only be a slow comfortable motion instead of the unpleasantly rapid bounce given by hard springs.

The strength of the springs is conventionally expressed by their static deflection, best visualised as the distance they are compressed when the weight of the body is slowly applied. Hard springs thus have a low figure and soft ones a high static deflection. This method provides a direct numerical comparison of the softness of the springing independently of variations of vehicle weights or number of springs concerned,

In actual practice, for really good vertical riding, a static deflection of at least 8 in. is needed. About 2 in. of this total should be allotted to the axlebox springs for, besides other advantages. this permits the remaining 6 in. to be allotted to the bolster springs, so best fitting them for their role as the last line of defence in protecting the passenger from vertical disturbances. Mainly because the difference between the empty and the fully-loaded height of the body would become excessive, the limit of softness is about 10 in. total static deflection.

These soft bolster springs should not be positioned conventionally as shown in Fig. 2a; it is most important that they be widely spaced as in Fig. 2b to reduce the rolling tendency of the body, though other features described later also assist to combat it.

Coil springs

While new developments such as air springs may be used in the future, the well-known steel coil spring is almost ideal. Properly designed and made, it is cheap, light, compact, and reliable and cannot spoil its theoretical performance by internal friction. In contrast, laminated springs for railway service are heavy and bulky and cannot work without a large amount of unpredictable and uncontrolled friction. They therefore tend to deflect only in large jerks and give no

response to small changes in load. Their poor contribution to the suspension system is very noticeable when two trains are running alongside, whereas the almost continuous action of the coil springs is easily seen.

The elimination of friction in the spring system introduces one disadvantage in increased likelihood of body bouncing or pitching. These two terms refer to somewhat similar actions, indeed, a passenger seated in a compartment over a bogie may not be aware of any difference. When bouncing the whole coach body moves up or down on the springs at once, but during pitching it see-saws.

Neither bouncing nor pitching is likely unless the regular shocks from rail joints, though small in themselves, are repeated at just the right time interval to develop the movement. Termed resonance, this situation is exampled by a child's swing, where a small push at the right instant makes the swing go higher and higher.

For a standard rail length most vehicles have two widely different speeds at which this resonance can occur; the springs must be designed to suit the body characteristics so that one resonance speed is low and the other well above the operating limit. Being a rhythmic motion, vertical resonance is amenable to mathematical treatment (1). The majority of bogie movements is far from rhythmic and the mathematical approach is unlikely to prove profitable because there is insufficient knowledge of the relevant conditions.

Vital role of damping

Though the majority of existing bogies has no dampers, there is little tendency to bounce or pitch even under conditions favourable to such actions. It is therefore doubtful if the proposed bogie stands to gain much from dampers under similar conditions, but they play a vital role in helping to absorb out-of-theordinary bogie movements with least shock to the body. If, for example, a more severe track imperfection produces an abnormal upward movement of the bogie, the soft bolster springs may be fully compressed before they have had time to lift the bolster (and body) far enough to avoid the bogie frame striking the bolster stops. The hydraulic type of damper can be set to resist strongly such a rapid movement and can provide an additional force of up to one ton to speed the raising of the bolster.

Conversely, when the bogie movement is slow, the soft springs are in their element and perfectly able to cope; any resistance to motion by a damper would be highly undesirable. Here again, the hydraulic damper is very suitable, for it is easily arranged to give no resistance to slow movement.

Selective damping desirable

As normally mounted, the best damper is not an unmixed blessing (2). Most bogie disturbances are sharp movements up to perhaps 1 in. away from the main position and back. Here, too, the soft springs are virtually ideal and no damper is needed, for it would show little discrimination between the large rapid movement where resistance is needed and the smaller rapid movement where it is not. In the latter case, the dampers actually would be increasing the shocks

A hydraulic damper could be made to give no resistance before reaching, say, I in, displacement from the mean position, but this would be of limited use when this mean position may itself vary by 2 in, or more, depending on whether the carriage is empty or loaded.

A simple method of providing damping only when it is wanted is shown in Fig. 3. A standard hydraulic damper has its rubber end-washers spaced to give the desired free movement either side of a mounting whose location alters automatically to suit variations in the mean position of the bolster. This is done by connecting the mounting to the bogie frame via an oil-filled dashpot and using very soft small springs to locate it at a set distance from the bolster. Thus, when the body sinks or rises as the load alters at a station the dashpot allows the damper bottom mounting to move slowly under the action of the small springs to its new

mean position, the process taking about 30 sec. During running, the dashpot behaves as if it were almost solid-the displacements are too rapid to affect it -and the damper can act normally as required.

Vertical movements of axleboxes

Provided that bogie pitching has been made harmless by measures described later, vertical movements of axleboxes in the bogie frame have little effect on the body, and axlebox dampers, if fitted, need no refinements. Indeed, the friction type might be tolerated here, though it should never be used for the bolster, for it is always in action, both at the right time and the wrong.

For various reasons the bolster must be restricted to about 5 in. total vertical movement. The limiting stops must not be of the flat rubber pad type (Fig. 2a) which arrest the movement with an undesirable bump, but must have a more gentle action. The best method, shown in Fig. 2b, is common in road vehicles and employs an acorn-shaped piece of rubber contacted by the bolster about I in, before its extreme position. Correct shaping causes the arresting load to rise steeply as the rubber is compressed, giving the desired cushioning.

Soft lateral suspension

Bad lateral riding can be more disconcerting than bad vertical riding. It has been shown that soft springs are essential to vertical comfort; it can be similarly shown that a soft lateral suspension is vital for lateral comfort. Another experiment with the weight on the elastic demonstrates that small rapid side movements of the top of the band have little effect on the weight, whereas holding the band halfway down produces much more movement.

Clearly the swing-links should be long; at least 24 in. is desirable (Fig. 2b). They should be parallel to each other: inclination as in Fig 2a shortens their effective length. The use of double bolsters to achieve a double swing-link length is a needless complication, particularly as simple rubber units are available which

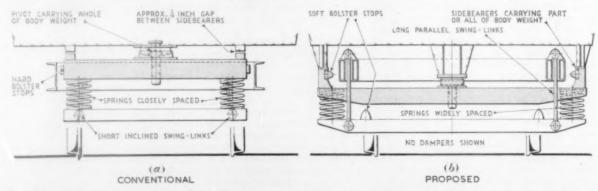


Fig. 2—Comparative designs of bolster suspension showing, right, proposed construction for helping to reduce body rolling

make short links behave like long ones. For good riding, friction must be eliminated as in the springs; the ordinary pin mounting is unsuitable, but several very satisfactory alternatives exist.

The bolster should be permitted about 3 in. movement either side of the central position. A lesser figure would not allow the long links fully to display their capacity for absorbing shocks from the occasional badly-aligned piece of track. Again, when running at speed round a curve, centrifugal force may make the bolster settle temporarily about 11 in. outward from the central position; the remaining 13-in. play is essential to accommodate inaccuracies in the alignment of the curve. This temporary displacement from the central lateral position is akin to the variations of the mean vertical position of the bolster due to passenger load changes. A like arrangement of hydraulic damper should therefore be employed, though not with the same settings.

The suspension is subject to resonance laterally, but the conditions are not clearcut like those for vertical resonance. The movement has its source in the coning of the tyres, but their action depends so much on their state of wear and that of the rails that the resonant running speeds can vary widely. Prediction by calculation thus has a very limited usefulness, particularly as other measures yet to be described should virtually eliminate the trouble, but any that does occur should be rendered innocuous by the soft lateral suspension. Track trials are the only real answer; slight changes in the design of small items such as the acorn-shaped rubber stops are readily made and enable the best combination for all conditions to be found.

Rolling of the vehicle body

The soft lateral suspension also plays a useful part in the reduction of rolling. Any lateral movement of the bogie is taken up partly by lateral motion of the bolster and partly by rolling of the body, the amounts of each being determined by their relative stiffnesses. An extreme example is provided by the steam locomotive which is allowed negligible lateral movement of the coupled wheels and is thus very subject to rolling.

The increased tendency to roll inherent with the use of soft bolster springs should be more than neutralised by their wide spacing and the long swing-links, but anti-roll linkages can be used if necessary. Rolling resonance is closely associated with lateral resonance and is equally difficult to predict; the remarks relevant to the latter are again applicable.

It is very easy to sabotage the soft bolster suspension by antiquated methods of guiding the bolster in the bogie frame. It must be allowed perfectly free vertical and lateral motion yet be rigidly positioned in the longitudinal direction of motion, for reasons to be stated later.

Metal-to-metal sliding surfaces are the traditional way of bolster guidance, still perpetuated in many begie designs. To avoid jamming, such slides must not fit closely, so that even when new they cannot position the bolster rigidly. Wear worsens matters, resulting in the average bolster of this type having a loose play of up to ½ in. As will be shown later, this

first takes up the loose play in the slides, after which it tries to rotate the bolster. For various reasons the latter is relatively difficult to rotate about the pivot and the rubbing faces of the vertical slides may thus be in heavy contact. No matter how good the springs the resulting friction makes the body ride like a bicycle with a flat tyre.

A demonstration of this friction in the

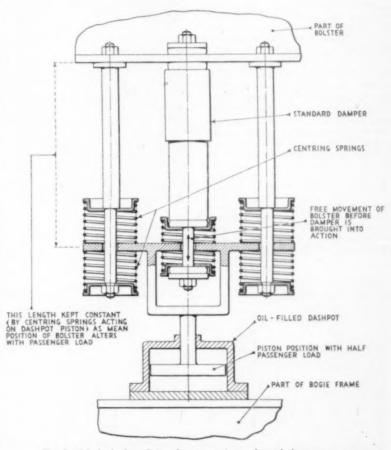


Fig. 3-Method of confining damper action to large bolster movements

play together with that in the axlebox slides allows lateral hunting to develop. They are also the cause of the objectionable backward jerk at the instant of stopping — a steam locomotive is free from this fault. Such slides are difficult to lubricate satisfactorily and usually impossible to adjust or repair without removing and dismantling the bogie.

Friction in bolster slides

An even more serious fault of the conventional slides is that they are the main cause of harsh vertical and lateral riding. Although in theory the friction in the slides is low, in practice it is generally high, due to the fact that the bogie is usually rotating slightly first one way and then the other even while running on straight track. This rotation

bolster slides is provided by the driving bogie of a diesel multiple-unit train.

When accelerating, the tractive effort is highest at low speeds and falls off as speed rises; the bolster friction varies accordingly and is quite noticeable. When coasting begins the riding improves at once to that of a non-driving bogie. An electric or diesel-electric multipleunit train exhibits similar properties, but the comparison is confused by the inherent difference in riding between motor and non-motor bogies of the conventional type due to the weight of the motors.

A brake application usually causes harsher riding in all bogies by increasing the pressure on the slides as just described. Sometimes the arrangement of the brake rigging partly offsets this pres-

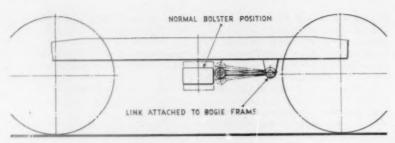


Fig. 4-Bolster guidance by rubber-bushed link

sure, the friction effect then being less noticeable.

A cheap method of bolster guidance without any of these faults is the rubber-bushed link, shown diagrammatically in Fig. 4. The bushes allow each mounting pin to rotate a few degrees in the link in the same manner as one's finger-bone can be rotated inside the skin, the flesh acting as the rubber in the bush. In addition to the vertical movement shown,

the flexibility of the bushes also allows the bolster to move laterally and to tilt slightly.

Rigid longitudinal positioning of the bolster is given naturally by correctly-designed bushes, but this very advantage can lead to longitudinal vibrations reaching the body. When pitching, a bogie frame pivots about the point where its mass can be considered as concentrated—its centre of gravity—positioned approximately as in Fig. 5.

If the link attachment—here deliberately shown too high—is not placed on a level with the centre of gravity, during pitching it will move to and fro as shown. From the body's viewpoint it would be decidedly disturbing to have the 5—6-ton mass of the bogie underneath moving longitudinally up to $\frac{1}{8}$ in. at about 5 cycles a sec.

This type of bolster guiding system needs no lubrication and is completely free from wear. It costs less than the conventional slides to install, maintain, and repair and ensures that the high standard of functioning does not deteriorate between overhauls. The links are best placed outside the bogie frame for easy accessibility; indeed, unless plainly visible it can usually be assumed that a bogie has the conventional slides.

(1) Koffman, J. L.

REFERENCES
... "The Riding Properties of Bogie Vehicles": The Railway Gazette, Dec. 11, 1959.
"Hydraulic Dampers": The Railway Gazette, Oct. 30, 1959.

To be continued

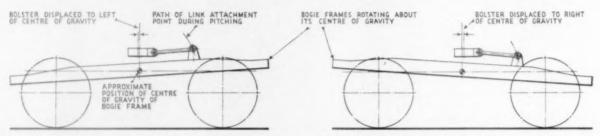


Fig. 5—Guide link positioned too high gives fore-and-aft movement to bolster when bogie pitches

Air-conditioning on the "Mistral"

Concluded from page 16

"Mistral" runs. In spite of this, a substantially constant temperature is maintained in the compartments and corridors of the coaches and the rare complaints from passengers are usually the result of an error of judgment in selecting the temperature level or else come from persons who are very sensitive to the cooling effect of a fairly active air circulation.

From August, 1956, to October, 1960, the average distance travelled per coach was nearly 1,200,000 km., and no defect of a recurring nature has been recorded.

The maintenance work, which is undertaken by specialised personnel, is confined to cleaning (especially of filters), replacement of certain parts susceptible to electrical or mechanical wear and, in particular, periodical checking and adjustment of the thermostatic circuits.

Maintenance is heavier than that required for the lighting and heating installations of a conventional type of coach and it is of prime importance that it be carried out regularly. Against this heavier maintenance can be set a not inconsiderable reduction in the mainten-

ance of interior furnishings, which require cleaning much less frequently than do those of coaches with opening windows, and a further saving on the maintenance of the windows themselves, which, as already stated, are of the fixed type.

DIESEL LOCOMOTIVES FOR C.I.E.

The first two diesel-electric locomotives from an order of 15 950-h.p. locomotives placed by Coras Iompair Eireann with the General Motors Corporation of the United States last July will arrive in Dublin this week. The purchase of these locomotives marks another step in the C.I.E. modernisation programme. The new locomotives will be capable of a speed of 77 m.p.h., and will be used for both passenger and freight services. The short light frame and low axle loading of these engines will permit of their operation on all branches and sections of the system. It is expected that full delivery will be completed by the end of January.

Also on order are 14 sets of power equipment from Maybach Motorenbau G.m.b.H., Germany, for use in 400-h.p. diesel-hydraulic locomotives which will be built at Inchicore Works. These engines will have a speed of 45 m.p.h. and are intended for use on freight and branch line services.

A further seven diesel-hydraulic loco-

motives of 160 h.p. with maximum speed of 25 m.p.h. are on order from Klockner Humboldt Deutz A.G., Germany, and will be used for shunting purposes.

These new locomotives will bring the total number of diesel units up to 232, including 93 railcars. When all the new locomotives are put into service it will mean that 92 per cent of C.I.E. trains, both passenger and freight, will be operated by diesel traction. The decision to change over from steam to diesel power has already resulted in an annual saving of £1,000,000 in fuel costs and has played a big part in the improvement of C.I.E. rail services. Faster, cleaner trains and brighter stations form part of the programme to raise general standards.

BRITISH OXYGEN CO. LTD. RESULTS

Net profit of British Oxygen Co. Ltd. for the year ended September 30, 1960, amounts to £4,426,993 compared with £3,935,579 in 1958-59. The final dividend is 10 per cent, making 16 per cent, against the previous year's effective 14 per cent.

MAMMOTH RAIL PRESS

The Clearing Division of U.S. Industries Inc. kept open house during the period of the Machine Tool Exposition held recently in Chicago. Equipment in process or assembly included structures for a 3,000-ton rail press which is claimed to be the largest press ever to be shipped to Argentina.

PERSONAL

Beyer Peacock & Co. Ltd.

The following changes, effective from January 1, have been announced by Beyer Peacock & Co. Ltd.: MR. JAMES HADFIELD Succeeds MR. HAROLD WILMOT, who has reached executive retirement age, as Managing Director of Beyer Peacock & Co. Ltd., Chairman of Beyer Peacock Gorton Limited, and Managing Director of the Richard Garrett Engineering Works Limited.

Other changes made are: MR. M. A. CRANE and MR. H. G. KENNEDY to be directors of Beyer Peacock Gorton Limited; MR. R. J. HADFIELD and MR. E. CUTHBERT to be directors of the Richard Garrett Engineering Works Limited in succession to MR. H. G. KENNEDY and MR. J. A. T. BARSTOW; MR. J. A. T. BARSTOW to be a director of Denings of Chard Limited and of Brecknell Willis Limited.

MR. HAROLD WILMOT, C.B.E., Chairman of Beyer Peacock & Co. Ltd., who has retired from the positions of Managing Director of that company, Chairman of Beyer Peacock Gorton Limited and Managing Director of the Richard Garrett Engineering Works Limited, was born in 1895 at Matlock in Derbyshire. In 1924 he joined Beyer Peacock & Co. Ltd. as Cost Accountant.



After working in various executive capacities, he was appointed General Manager in 1934. In the same year he became Managing Director of the Richard Garrett Engineering Works Limited. Four years later he became Managing Director of Beyer Peacock & Co. Ltd., and was elected Chairman of the company in 1949. It was in that year that he was made a C.B.E. In 1939 he led a delegation of the Locomotive Manufacturers' Association to Turkey, and later made an extensive tour of South Africa and Rhodesia. Mr. Wilmot is a Past President of the Institute of Costs & Works. He has twice been President of the Locomotive & Allied



Manufacturers' Association. From 1956 to 1958 he was Chairman of the British Institute of Management, and since 1958 has been Vice-President of that body. He is also a member of the Advisory board of the European Productivity Agency, a member of the Working Party of the Council of Euronean Industrial Federations and a member of the Panel on Overseas Credit & Investment of the Federation of British Industries and a member of the Institution of Loco-motive Engineers. Mr. Wilmot retains the positions of Chairman of Beyer Peacock & Co. Ltd., the Richard Garrett Engineering Works Limited, the Anti-Attrition Metal Co. Ltd., Beyer Peacock (Hymek) Limited, Locomotive House Limited, and the Locomotive Manufacturers' Co. Ltd.

MR. JAMES HADFIELD, M.B.E., Deputy Managing Director of Bever Peacock & Co. Ltd... who has been appointed Managing Director of that company, Chairman of Beyer Peacock Gorton Limited and Managing Director of the Richard Garrett Engineering Works Limited, was born in 1900. He attended the Manchester College of Technology, and his early training in locomotive engineering was obtained in the Gorton Works of the former Great Central Railway. He joined Beyer Peacock in 1924 as a draughtsman, and four years later transferred to the Works as Assistant Production Engineer. In 1929 he was put in charge of the Progress Department, and in 1930 became Assistant Works Manager. From 1933 to 1939 he was in charge of the Drawing Office, and in 1940 he was appointed Technical Superintendent responsible for the Works and Drawing Office. Promotion to Technical Manager, responsible for all design and manufacture, followed in 1943, and in the same year he was made a local director of Beyer Peacock & Co. Ltd. In 1947 he was appointed to the board of Richard Garrett Engineering Works Limited. He was appointed a director of that company in 1954, Technical Director in 1956 and became Deputy Managing Director in April of last year. He is Chairman of Air Control Installations Limited, B.J.N. Engineering Limited, and Theramic Limited, and a director of the Anti-Attrition Metal Co. Ltd., and Beyer Peacock (Hymek) Limited. He was made an M.B.E. in 1944 in recognition of his work in connection with war contracts. He is a member of the Institutions of Mechanical Engineers and Locomotive Engineers and a Fellow of the British Institute of Management.

MR. M. A. CRANE, Technical Sales Manager of Beyer Peacock & Co. Ltd., who has been appointed a director of Beyer. Peacock Gorton Limited, obtained early training with the Great Western Railway at Swindon. He joined the Nigerian Railway in 1928 as Draughtsman & Technical Instructor in charge of the Technical Training Institute, subsequently holding the positions of Chief Draughtsman, Research Officer, Acting Works Superintendent, and District Running Superintendent with that system. He later became Senior Locomotive Superintendent, Gold Coast Railway, He joined Beyer Peacock & Co. Ltd. in 1942 as Assistant to



the Sales Director and, in the course of his duties, he has visited railways in many parts of the world. He also has been closely associated with the production of films and books. He has been recently nominated a Vice-President of the Institution of Locomotive Engineers. He became London Manager of Beyer Peacock & Co. Ltd. on January 1, 1954, and, on the retirement of MR. W. CYRIL WILLIAMS on April 30, 1954, he took charge of the London Office of the company and of the Publicity & Technical Sales Department, and was then appointed Technical Sales Manager of the company. Mr. Crane is also Chairman of Rail Traction

Supplies Limited, Beyer Peacock Railway Equipment Limited and the Federated Engineers Limited, and a director of Beyer Peacock (Hymek) Limited, Theramic Limited and Space Decks Limited. He is a Member of the Institution of Mechanical Engineers.

New Year Honours

The following is a selection of New Year Honours of transport interest:—

Knight of the Thistle

DR. CECIL DANNATT Vice-Chairman, Associated Electrical Industries Limited.

Knight Grand Cross

SIR ELLIS HUNTER, Chairman & Managing Director of Dorman Long & Co. Ltd., former President of the British Iron & Steel Federation.

Knight Commander

SIR ARTHUR MORSE, former President & Chairman of the British Travel & Holidays Association.

Knight Bachelor

MR. GEORGE EDWARD BEHARRELL, Chairman of the Dunlop Rubber Co. Ltd.

C.B.

MR. REEP LINTERN, Under-Secretary, Ministry of Transport.

C.M.G

MR. JOSEPH WILLIAM STANLEY PEGRUM, formerly General Manager, Rhodesia Railway.

C.B.E.

MR. CHARLES HOLT, Managing Director of Thos. Cook & Son Ltd.

MR. JAMES BRYAN SCOTT, Sales Director of Crompton Parkinson Limited.

MR. ARTHUR JAMES YOUNG, Managing Director of the English Electric Valve Co. Ltd. MR. LIONELL INGERSOL GORDON, Crown Agent, Edinburgh.

M.B.E.

MR. HAROLD HAMILTON POWELL, Architect, British Railways, Eastern Region.

B.E.M.

MISS NELLIE COTTERILL, Station Refreshment Room Manageress, British Transport Hotels & Catering Service.

U.I.C.

M. JEAN ALFRED TUJA, who has relinquished the position of Secretary-General of the International Union of Railways (U.I.C.)



on December 31, was born in 1895 at Le Puy. France. He was educated at Lyons and Paris, and entered the Ecole Polytechnique in 1914. During the 1914-18 war, he serve as an officer in the Engineers and, late, in the Air Force. In 1920 he graduated from the Ecole Polytechnique as a State Engineer and was selected for the Ecole Nationale Supérieure des Mines. He resigned from Government service in 1922 to join the Traffic Department of the Paris, Lyons & Mediterranean Railway Company (P.L.M.) as a Principal Engineer. He became Assistant Operating Officer & Head of the Traffic Department in 1935. He was appointed General Manager of the South Eastern region of the S.N.C.F. in 1941, and Head of the Traffic Department in 1943. In 1945 he was seconded to the European Central Inland Transport Organisation (E.C.I.T.O.), and became Assistant Director General of that body in 1947. Later that year he went to the Transport Division of the Economic Commission for Europe at Geneva as Head of the Railway Section, and in February, 1949, he was appointed Secretary-General of the U.I.C. At the request of the Board of Management and the General Assembly of the U.I.C., he will remain as an adviser for a period of two years. M. Tuja is an Officer of the Légion d'Honneur.

M. LOUIS ARMAND, who assumed the duties of Secretary-General of the International Union of Railways (U.I.C.) on



January 1, 1961, was born at Cruseilles, Haute Savoie, in 1905. In 1924. after completing his secondary education at Annecy and Lyons, he entered the Ecole Polytechnique. After graduation he was selected for training at the Ecole des Mines. In 1934 he joined the Paris, Lyon & Mediterranean Railway Company and held various senior posts, which gave him a very wide knowledge of all aspects of the railway industry. During the 1939-45 war he was closely associated with the work of several resistance movements, and was head of the "Résistance-Fer" group. In 1946 he was appointed Assistant General Manager of the S.N.C.F. In June, 1949, he became General Manager, and in 1955 Chairman of the Board of Directors. In these various offices he paid special attention to the completion of the reorganisation of transport in France and continued the productivity policy instituted since the war. From October, 1951, to December, 1958, he was Chairman of U.I.C., and in January, 1958, he became Chairman of Euratom, and remained in that office until the end of February, 1959, M. Armand is an Honorary Knight of the Most Excellent Order of the British Empire (K.B.E.), a Grand Officer of the Légion d'Honneur and he holds various other high French and foreign decorations. He has recently been elected a member of the Académie des sciences morales et politiques.

Overseas



MR. JOHANN SCHUBERT, Deputy Chief Mechanical Engineer & Chief of the design section of the Austrian Federal Railways who, as recorded in our December 23 issue, retired on December 31 after 40 years' service. After periods in the design and works divisions, he became Section Chief for electric locomotives and then Works Manager at the Linz shops of the system. During the war he was drafted to Germany, and after a period on planning he was appointed Manager of the large works and depot at Meiningen, in Thuringia. He returned to Austria in 1946, and was promoted to the rank of Ministerialrat in charge of the section for the planning and design of locomotives and workshops.

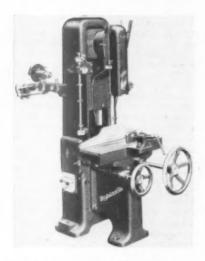
MR. T. CRAIG, Manager for Scotland, Canadian Pacific Railway, Glasgow Office, has retired. He is succeeded by Mr. C. Gow, Assistant Manager for Scotland.

Errata

MR. G. COLLINGWOOD and MR. S. B. WARDER have been re-nominated as Vice-Presidents of the Institution of Locomotive Engineers, not, as recorded in our December 30 issue, nominated for the first time.

We regret that MR. J. H. GIFFIN, who retired from the position of Superintendent (Running), Central Road Services, London Transport Executive, on December 31, was incorrectly recorded as Mr. J. H. Griffin in our December 30 issue.

NEW EQUIPMENT and Processes



CHAIN & CHISEL MORTISER

The Robinson ZH/E chain & chisel mortiser embodies two features which, it is claimed, have not been offered hitherto with this class of machine.

A double depth stop arrangement enables both mortise and haunch to be gauged positively at one set-up, using either a chain or a chisel. Thus the need for re-handling workpieces to cut the haunches is eliminated, and time-saving and consistent accuracy in the fit of the finished product are claimed.

The second feature, which is optional, is a spacing and line-indicating apparatus. This includes a wood template with notches cut in it to correspond with the exact lengths and positions of the mortises required. The apparatus is designed to save time in repetition work and to ensure consistency of product during a production run and at subsequent reruns.

Both headstocks are simple to fit. Mortises up to 1½ in. wide and 5½ in. deep can be cut by chain, and up to 1 in. square by chisel.

The machine is powered by a 4-h.p. motor, suitable for either two- or three-phase a.c. supplies, which drives the chain direct from a sprocket on the motor shaft. The chisel headstock spindle, which runs in ball bearings, is driven through spiral-bevel gears. By means of an automatic cut-out actuated by the headstock, the tool is started when the headstock is lowered and continues to run until it is returned to the rest position.

A combined guard and chipbreaker is provided, with a panel of safety transparent material to enable the work to be viewed. The work is kept clear of chippings by means of a positively-driven fan mounted on the motor shaft.

The headstock is counter-balanced and is manually operated by rack and quadrant. The mortising table, which will accommodate timber up to 12 in. by 8 in., is fitted with longitudinal and cross-traverse adjustments, and a two-position inclined screw clamp.

Further details may be obtained from Thomas Robinson & Son Ltd., Railway Works, Rochdale, Lancs.

COOLING-SYSTEM TESTER

The Pickavant JWP.317 tester is designed for checking for faults the pressurised liquid-cooling systems of internal-combustion engines, particularly of the sizes used in railcars, small shunting locomotives, and commercial road vehicles. It is a precision instrument which will show defects in radiator caps, and locate leaks in radiators, cylinder heads, engine blocks, hoses, gaskets, and water pumps.

When used for checking radiator caps, the cap is fitted to the tester, which is pumped until the relief valve on the cap operates. The instrument dial is calibrated to show the specified pressure zones to correspond with the pressure figure marked on the caps. Thus the cap is shown to be defective if the pointer on the gauge is outside the zone.

For testing the cooling system, the instrument is fitted in place of the radiator cap, and is then pumped up until the cooling system is at a pressure corresponding with that marked on the cap. A drop in pressure shown on the

dial indicates leakage, and if not visible externally, proves an internal fault which otherwise might not be noticed.

Further details may be obtained from J. W. Pickavant & Co. Ltd., Bow Street, Birmingham.

PACK-CUSHIONING MATERIAL

Texlite is a lightweight pack-cushioning material of crimped rubberised hair developed by the Hairlok Co. Ltd. It is suitable for the packaging for transport of delicate electronic and electrical instruments, control equipment, fragile electrical apparatus, and machine parts.

The material is formed basically of curled hair, bonded with a carefully compounded latex rubber, and its special qualities are obtained by means of a new production technique. Better protection is claimed to be provided by 1 lb. of this material than by 2 lb. of ordinary rubberised hair.

Drop-tests carried out from a height of 4 ft. 6 in. have shown that, after 30 consecutive drops, the shock transmitted to a Texlite-protected pack increases only by about 10 per cent. It is also claimed that saturation of the material with water even slightly improves shock attenuation.

The material is produced in sheet form in standard densities of 4 lb. and 6 lb. per cu. ft., and in thicknesses of 1 in., $1\frac{1}{2}$ in., and 2 in. Other densities and special shapes can be provided to suit individual requirements.

Further details may be obtained from the Hairlok Co. Ltd., Magna Works, Kathie Road, Bedford.



Ministry of Transport Inquiry

Public inquiry into the incidents which led to the withdrawal of Glasgow suburban electric trains, British Railways, Scottish Region

Brigadier C. A. Langley, Chief Inspecting Officer of Railways, conducted an inquiry in Glasgow on December 22 and 23 on behalf of the Ministry of Transport into the acidents which occurred in the Glasgow suburban electric trains, British Railways, Scottish Region, on December 13 and 17.

Before taking evidence Brigadier Langley asked Mr. S. E. Raymond, Assistant General Manager (Traffic), Scottish Region, to make an opening statement giving a brief résumé of all the incidents affecting the electric trains which led up to the suspension of the service following the explosion on December 17, and further information relating to the accidents on December 13 and 17.

Accident at Renton

Dealing first with the accident at Renton, Mr. Raymond said that this occurred at 7.9 a.m. on December 13, on the Dumbarton side of Renton Station, which is on the Dumbarton-Balloch branch line. The train concerned was the 7.0 a.m. electric, Balloch Central to Bridgeton Central, composed of two three-car electric units Nos. 041 and 051. Working was normal from Balloch to Renton. Immediately after leaving Renton the guard requested a re-set of the pantograph on set 051 and within a few seconds an explosion occurred in the guard's compartment of the same unit, seriously injuring the guard. A passenger pulled the communication cord which brought the train to a stand.

There was considerable damage to the guard's compartment of which the doors were displaced and door frames bent, the ceiling damaged and the partition forced into the adjacent passenger section to the extent of 12 in. Equipment in the guard's van was damaged and seating displaced in the passenger section. There was no derailment or fire.

The train carried about 230 passengers distributed evenly through the six coaches. Two passengers sustained serious injury and five other passengers suffered slight injury or shock.

Protection of the line was given almost immediately by the driver, the only trainman available, with the guard injured. An isolation of the overhead line was applied at 7.40 a.m. The disabled train was drawn back to Alexandria at 10.20 a.m. The isolation was withdrawn at 10.45 a.m., and normal working resumed at 11.5 a.m. At the time of the accident the weather was foggy and the visibility in the Renton area was approximately 150 yd.

Explosion during trial running

Mr. Raymond went on to describe briefly and in layman's language the action taken on the technical side before and after the Renton accident. He explained that before the public service opened, but during trial running on October 30, an explosion occurred in the leading guard's van of an empty six-car train consisting of units Nos. 003 and 056 at Charing Cross, without injuries to staff. As a result of examination of the damaged set by the manufacturer, A.E.I. Limited, and technical officers of the British Transport

Commission, certain modifications were made to prevent further explosions and no electric trains were allowed into public service until these modifications were completed by the manufacturer.

On November 14 there was a further incident involving the transformer in a train consisting of two three-car sets Nos. 010 and 042. After loss of power being experienced on the 6.30 a.m. Airdrie to Dalmuir Park the two units were taken out of traffic on arrival at Dalmuir Park and the transformer in unit No. 042 was found to be defective. No explosion or incident occurred, and it appeared that the modifications had worked satisfactorily.

The fact that an explosion occurred in the guard's van of unit No. 051 in the Renton accident was *prima facie* evidence that although the explosion did not appear to be so violent as at Charing Cross, the modification had on that occasion not worked completely.

Inspection at Hyndland

An urgent examination was, therefore. made of unit No. 051 at Hyndland Maintenance Depot by technical experts of the British Transport Commission and the makers of the equipment, A.E.I. Limited. The situation demanded that danger to passengers and staff should be removed entirely by eliminating the possibility of an explosion occurring in the guard's van or passenger accommodation. It was understood that the source of both the Charing Cross and the Renton explosions was in the transformer, but the immediate concern was the protection of passengers and staff. As a result of the technical examination, it was decided that further modifications should be carried out and an assurance was given that these further modifications would remove the danger from the guard's van. It was decided that no electric set would be allowed into public service until these modifications had been carried out and work proceeded throughout the night of December 14/15. By about 4 a.m. on December 15, 44 three-car units had been completely modified. This meant that stock was short for service that morning, the minimum requirements being 50 three-car sets, but the order that only fully modified sets should be used was strictly enforced.

Transformer failure

In the afternoon of December 14, a further incident occurred between Parkhead and Carntyne Stations to a six-car train consisting of Units Nos. 022 and 031 which resulted in unit No. 031 being taken out of service and on examination it was indicated that the transformer had failed in apparently the same circumstances, but the modifications had worked, no explosion took place and no injuries occurred to passengers or

Mr. Raymond next referred to the second incident which was the subject of the inquiry, which occurred at about 1.55 p.m. on December 17, near Easterhouse Station on the Bellgrove to Airdrie line, and concerned

a train consisting of two three-car units Nos. 014 and 065.

Soon after leaving Shettleston Station the guard requested a re-set of the pantograph on unit No. 014. The driver was unable to effect a re-set and there was some loss of speed before Garrowhill Station was reached. As the train departed from Garrowhill white vapour was seen issuing from beneath the rear vehicle. Very soon afterwards there were three bangs accompanied by smoke, and the guard requested the driver to stop the train, which was done 700 yd. ahead of Garrowhill, about mid-way between that station and Easterhouse. The driver played his fire extinguisher on the transformer below the guard's compartment from where the smoke was issuing. There did not appear to him to be an actual outbreak of fire, but certain underparts close to the transformer seemed to have been smouldering from excessive heat. The guard immediately proceeded to a near-by signal telephone and advised the signalman, who in turn advised the stationmaster at Easter-

Immediate precautions

The rear unit No.014 was isolated and, by arrangement between the stationmaster and the driver, the train was worked forward to Easterhouse at 2.10 p.m. where the passengers, numbering some 250, were detrained. There was no alarm or injuries reported. As a precaution a call had been made at 2.11 p.m. for the fire brigade which arrived at 2.23 p.m. An isolation of the overhead line was applied at 2.11 p.m. on the up line, and on the down line at 2.17 p.m. in preparation for any action the firemen were likely to take.

At 2.27 p.m. the firemen were satisfied the position was under control. They found no actual fire, but smouldering parts with a little smoke on which they played one fire extinguisher. The set was removed to Heatheryknowe Loop for examination at 2.40 p.m. Isolation was withdrawn at 2.34 p.m. on the down line when normal working was resumed on that line, and at 2.50 p.m. on the up line when normal working was resumed on that line.

Damage to transformer

The examination indicated the same fundamental trouble as had occurred in the accident at Renton and the incident at Parkhead the same week. While the modifications carried out on December 15 appeared to have worked the pressure in the transformer itself was so extreme that the bottom casing lid was sheared off on three sides and was hanging with some of the contents of the transformer in a position very close to rail level.

Although the modifications gave the required protection to the guard's and passenger accommodation a new risk appeared for the first time. This involved the danger of damage to the under-carriage equipment and the track, and was such that the management decided in the early hours of Sunday morning to withdraw the electric trains from public

service immediately. This was done in the interests of the safety of passengers and staff, until the fundamental cause of these troubles could be established and a cure found.

Overheating of transformer

Evidence about the transformers was given by Mr. J. A. Broughall, Electrical Engineer (Development), British Transport Commission, when the inquiry was resumed on December 23. He said that after the incident on October 30 at Charing Cross, when an explosion was stated to have occurred in the leading guard's van of an empty six-coach train on a trial run, the transformer was examined. It was found that although the primary windings were undamaged the secondary windings were considerably overheated to such an extent as to vaporise the oil in the transformer.

Mr. Broughall pointed out that the difficulty in finding the cause of these transformer failures had been magnified because of the severe damage to them. He said that during trials before the opening of the service the trains had run a total mileage of 100,000 and that one train had run more

than 20,000.

The Charing Cross incident which happened on the last day of the full-scale trials, was caused by an accumulation of oil vapour in the guard's compartment where there was an oil tank used in the circulation of oil to the transformers underneath. This tank was ignited by a small spark from a piece of electrical gear in a cupboard. Mr. Broughall said that this contingency was one for which, it became clear, they had made no adequate provisions.

Equipment tests

He said that in March and April, 1959, the prototype of the new type transformer was tested. The transformers were found satisfactory and accepted. Since then all transformers had had to be tested in accordance with contract. He described the precautions built into the system by way of thermostats. pressure gauges and so on and added that the damaged train was thoroughly inspected and the cause of the explosion determined.

Because the secondary windings had become seriously overheated it was agreed with the manufacturer that a new 1-in. ventpipe which could be fitted quickly into a filling plug would prevent the accumulation of vapour. He said they were confident that they had made a safe job, though they were still uncertain of the fundamental cause of

the trouble with the transformer.

Dealing with the next incident, a week after the public service began, Mr. Broughall said a transformer had begun to leak oil and a train was put out of service. That led engineers to believe that the protective devices which had been fitted were effective because when they took this transformer down its internal condition was exactly the same as the others.

The gases had safely vented through the new pipe put in and there had been no explosion and no danger to anyone. did give us a confidence which was later to mislead us," he said. Engineers were still looking for the fundamental cause in association with the makers and they selected four transformers which would be taken out for examination, including one which had been in service longest.

Mr. Broughall went on to deal with the explosion at Renton. The cause of this, he said, was the same as that on November 14 at Dalmuir Park-gases escaping. Engineers had no alternative but to infer that there was a possibility of leakage which they had not cleared by putting in a bigger vent.

"We decided that by making a large hole in the roof above the conservator and a large hole in the floor of that compartment we could rely on any gas which leaked into that compartment being safely dispelled without causing an explosion, even if there

was a small arc.

Mr. Broughall said the third transformer failure occurred on December 14, at Carntyne and was of the same nature as the others. Finally he dealt with the transformer failure at Garrow Hill on December 17, after the result of which the service was withdrawn. He said this decision was taken because on that occasion, though there was no explosion, a new risk arose when parts of the transformer were displaced close to the running track, and damage was much worse than in the earlier incidents.

Mr. Broughall said there had been no record of transformer failures of this kind in any other equipment supplied to British Railways during the modernisation pro-

gramme in the various Regions.

Mr. S. Whyman, A.E.I. Traction Division Director and General Manager, said that the only point on which he differed with Mr. Broughall was on the vaporising of the transformer oil. "My own experience is not the vaporising of oil but the cracking of oil into combustible gases due to very great heat."

At the conclusion of the inquiry Brigadier Langley said that if he decided to re-open it in public he would take the necessary steps. In any case his report would be presented to the Minister of Transport and published as

soon as possible.

English Electric Co. Ltd. in 1960

During 1960 the English Electric Co. Ltd. continued to produce electric and dieselelectric locomotives for service throughout the world. For British Railways, a further contract for 30 Type "1" 1,000-h.p. dieselelectric units was completed, making a total of 50 now in service with various Regions of British Railways, and in addition the hundredth Type "4" 2,000-h.p. locomotive was completed in October and handed over for

Orders received during the past year included those for Types "1," "3" and "4" diesel-electric locomotives of 1,000, 1,750 and 2,000 h.p. respectively. Apart from complete locomotives, English Electric continued to supply 400-h.p. diesel-electric shunting locomotive equipments to British Railways and during the year, received a further order for 98 equipments. This makes a total of over 1,200 of this type of equipment in service or on order.

A notable event so far as British Railways was concerned was the opening in September of the Manchester-Crewe 25-kV. a.c. electrified line. The first official train to operate on this section of line was an English Electric 25-kV. 3,000-h.p. electric locomotive. Electric train equipments are still being supplied by the company to the Southern Region of

British Railways. To date, over 2,000 motorcoach equipments have been supplied since

The company has also been active in the export field. During the year, important contracts were completed for Ghana, East Africa and Sudan Railways, all for dieselelectric locomotives. The works of the English Electric Co. of Australia Pty. Ltd. supplied 400- and 800-h.p. diesel-electric locomotives for industrial use, and a third repeat order for 1,650-h.p. diesel-electric locomotives was received from the Queensland Government Railways.

The Danish State Railways ordered motor coach equipments for the 1,500-V. d.c. electrified lines around Copenhagen, and the Indian Railways 3,000-h.p. 1,500-V. d.c. electric locomotive equipments, the mechanical parts for which will be built in India, the first to be built there. Electric motor coach equipment is also on order for the Southern Railway of India.

The prototype "EM27" direct-drive gas turbine locomotive is commencing full-scale track trials and is expected to appear in main line revenue service early this year.

A number of important orders were received by English Electric during 1960 for mercury-arc and silicon rectifier equipment for industrial, electro-chemical and traction duties, and for mercury-arc converters, operating as rectifiers or inverters, for supplies to variable-voltage motor drives in rolling mill, and mine winder applications.

The opening of the Crewe-Manchester electrification saw the successful introduction of English Electric locomotive-mounted mercury-arc rectifiers for main-line traction duty. Following successful operation of a silicon rectifier unit with a new design of notchless acceleration in a 25-kV. multipleunit train, 42 power equipments of this type have been ordered for British Railways, Eastern Region.

Among new products introduced in 1960 is a range of 240 deg. instruments for traction purposes. These instruments have black Perspex dials on which are engraved the numerals and divisions. Illumination from lights behind the mounting panel is refracted through the Perspex to spotlight the pointer and the engraved portions of the dial. Another form of traction instrument that was introduced during the year is the single and double pattern edgewise instrument, which has been designed to meet the requirements of British Railways.

Notting Hill Gate Service

Over 40 per cent more passengers are using the rebuilt Underground station at Notting Hill Gate.

The improved station replaced two separate stations on opposite sides of the main road, and took four years to build. The last of the new escalators was opened five months ago. Since the rebuilding, the number of passengers using the station has soared from 93 million to 14 million a year. The greatest increase has occurred among passengers changing from one line to another. These have more than doubledfrom 21 million to 5 million a year.

The success at Notting Hill Gate has eased the heavy interchange at big Central London stations like Holborn and Totten-

ham Court Road.

The Nineteenth General Assembly of the U.I.C.

Twenty-nine countries represented at the meetings in Paris in December

The Nineteenth General Assembly of the International Union of Railways was presided over by Prof. Dr. Oeftering, Senior Chairman of the German Federal Railway and by Mr. John Ratter, Member of the British Transport Commission, supported by M. Tuja, Secretary-General and by M. Rousseau, Chief Executive Officer. The member countries of the General Assembly were represented by the following delegates:—

M. Quetand, Principal Engineer & General Representative in Algeria of the French National Railway

Austria

Herr Kratzer, Ministerial Adviser, Chief Motive Power Officer, Austrian Federal Railways

Dr. Jarisch, Head of the Legal Section, Austrian Federal Railways and Chairman, Eighth Committee of the U.I.C. Belgium

M. Adam, Manager, General Headquarters, Belgian National Railway Company, and M. Desorgher, Honorary Assistant General Manager, Belgian National Railway Company, Chairman of the third Committee of the U.I.C. Bulgaria

Represented by the Czechoslovak State Railways.

Czechoslovakia

M. Pospisil, Vice-Minister of Transport & Communication of the Czechoslovak Socialist Republic, and M. Hlava, Chief Engineer, Ministry of Transport & Communication.

Mr. Skov, General Manager, Danish State Railways, and M. Jensen, Chef de Section. Finland

Mr. Aalto, General Manager, Finnish State Railways. France

M. Dargeou, General Manager, French National Railway Company, and M. Martin, Head of the Motive Power & Rolling Stock Departments, Chairman of the fifth Committee of the U.I.C. Germany (DB)

Prof. Dr. Oeftering, Senior Chairman, German Federal Railway; Herr Geitmann, Chairman; Dr. Schelp, Chairman, and Dr. Hennig, Ministerialdirigent, Chairman of the sixth Committee of the U.I.C.

Germany (DR)
Herr Scholz, Vice-Minister, German State
Railways; Herr Lichtenfeld, Head of the
Central Technical Office, Chairman of the
seventh Committee of the U.I.C.; Herr
Schwarzer, Head of Division; and Herr
Mrossko, Principal Adviser.
Great Britain

Mr. John Ratter, Member, British Transport Commission; Mr. J. L. Harrington, Chief Shipping & International Services Officer; and Mr. G. M. Leach, International Traffic Officer, Chairman of the first Committee of the U.I.C. Hungary

M. Nemeth, Vice-Minister, General Manager, Hungarian State Railways; M. Borsi, Adviser; and M. Kercso, Adviser.

Mr. P. C. Kapoor, Railway Adviser to the High Commissioner for India in the United Kingdom. Ireland

Mr. C. S. Andrews, Chairman of Coras Iompair Eireann.

Sr. Rissone, General Manager, Italian State Railways; Sr. Cirillo, Chief Operating Officer, Chairman of the fourth Committee of the U.I.C.; and Sr. Cuttica, Former Deputy General Manager, Chairman of the Special Committee on Automatic Coupling. *Japan*

Mr. Yanai, Adviser in the Traffic Department, Japanese National Railways. Jugoslavia

M. Nikolic, Secretary of State, General Manager, Jugoslav Railways; M. Kolaric, Director, Economic Department; and M. Curda, Head of the International Relations Section.

M. Elefteriades, Vice-President & General Manager, Damascus-Hamah & Extensions Railway Company; and M. Chenut, Director & Deputy General Manager.

Luxembourg

M. Musquar, Manager, Luxembourg National Railway Company.

M. Gauvain, Head of the Secretariat, Moroccan Railway Company; and M. Gauvain, General Secretary, Franco-Spanish Tangier-Fez Railway Company. Netherlands

Mr. Lohmann, Chairman, Netherlands Railways. Norway

Mr. Stokke, General Manager, Norwegian State Railways; and Mr. Thorne, Principal Inspector, Poland

Mr. Tarantowicz, Under Secretary of State, Ministry of Communications; and Mr. Surmak, Head of Division, Ministry of Communications.

Portugal

Sr. de Espregueira Mendes, General Manager, Portuguese Railway Company; Sr. Branco Cabral, General Secretary; and Sr. Pires, General Agent in Paris.

M. Covaci, General Manager, Roumanian Railways; and M. Dinu, Engineer.

Spain

Sr. Puig Batet, General Manager, Spanish National Railways; and Sr. de Reparaz, Secretary General of the Board of Directors. Sweden

Mr. Upmark, General Manager, Swedish State Railways. Switzerland

M. Gschwind, Chairman, Swiss Federal Railways; M. Wichser, General Manager; M. Dirlewanger, Chief Freight Officer, Chairman of the second Committee of the U.I.C.; and M. Strauss, Secretary General of the Swiss Federal Railways, Chairman of the "Meeting of Railway film experts."

M. Baykara, Deputy Chief Motive Power Officer, Turkish State Railways.

Associate member administrations

German Sleeping Car & Restaurant Car Company

Herr Wustenhofer, Senior Representative.

London Transport Executive

Mr. A. H. Grainger, Deputy Chairman & Managing Director, London Transport Executive.

M. Delory, Honorary General Manager, Belgian National Railway Company and Chairman of the International Railway owned Company for Refrigerated Transport; and M. Pieffort, General Manager, Interfrigo.

Central office for Overseas Railways

M. Devouge, Assistant Manager of the

Photo] [La Vic cu Rail

Delegates attending the General Assembly of the International Union of Railways

Central Office for Overseas Railways.

Attached organisations

International Union of Railway Medical Services

Dr. Serati, Chief Medical Officer, Swiss Federal Railways, Chairman of the International Union of Railway Medical Services; and Dr. Ortega, Principal Medical Officer & Assistant to the Chief Medical Officer, Eastern Region, French National Railway Company, Secretary General of the U.I.M.C. Eurofima

M. Hasler, General Manager of the European Company for the financing of railway rolling stock,

Participating organisations

European Goods Trains Timetable Conference

M. Matula, Head of Division, Ministry of Transport & Communication of the Czechoslovak Socialist Republic, Chairman of the European Goods Trains Timetable Conference.

International Carriage and Brake Van Union and International Wagon Union

M. Tribelhorn, Chief Traffic Officer, Swiss Federal Railways.

Union of European Railway Road Services
Represented by the Netherlands Railways.

Organisation represented

European Passenger Trains Timetable Conference

M. Wichser, General Manager, Swiss Federal Railways, Chairman of the European Passenger Trains Timetable Conference.

Government organisations

Economic Commission for Europe

M. Le Vert, Director, Transport Division of the Economic Commission for Europe.

Central Office for International Rail Transport

M. Haenni Director, Central Office for International Rail Transport.

Federal Transport Office

M. Tapernoux, Senior Head of Section, Federal Transport Office; and M. Charpie, Senior Head of Section.

Holyhead services to Dublin

In answering criticisms contained in the results of a survey recently carried out by the Irish County Associations of the Holyhead services the London Midland Region of British Railways particularly emphasised

i. It is only during peak travel periods that trains and ships are sometimes subject to overcrowding, there being plenty of comfortable accommodation for everybody for the greater part of the year. Even during the period covered by the survey, the ships were fully or nearly fully loaded on only 30 of the sailings out of a total of 170 sailings; on 60 trips the ships were about half full or

ii. Plans are already under active consideration to prevent overcrowding at peak periods. These plans will be announced as soon as finalised and will be put into operation before next summer's holiday period. The suggestion in the report that restrictions on numbers of passengers permitted to travel must be strictly enforced is noted, but regulation of this kind would be kept to the minimum consistent with the public desire to avoid conditions of over-

iii. It may not be generally realised that

train catering facilities offered by British Railways are already far in excess of those available in any other country. Furthermore, the demand for catering on the relief trains serving Holyhead always comes at a time when there is a demand for similar additional facilities all over the Region. It is therefore extremely difficult to provide train catering on all occasions, but plans are being developed to provide facilities, possibly of a simplified kind, even on relief trains at peak periods.

Benefit from modernisation

iv. When the modernisation work on the main line between London and Crewe is completed, great benefit will be felt by users of the Holyhead services. Meanwhile, everything possible is being done to limit delays while the work is in progress, but there is bound to be some inconvenience to passengers.

All the conclusions and comments put forward by the Irish County Associations in its report on the survey are receiving careful

consideration.

Computer compilation of bus timetables

London will be the first city in the world to operate its buses according to timetables compiled by an electronic computer, if the present rate of progress on automatic timetable compilation is maintained. It should then be possible to produce, quickly, schedules reflecting the changing requirements of passengers.

Joint investigation

Members of the London Transport Executive electronic data processing unit and E.M.I. Electronics Limited have been jointly investigating the problem for several months. They have now succeeded in compiling and printing, on an "EMIDEC 1100" computer, in 30 sec., a timetable for the simplest type of bus route, which would take a schedule compiler at least an hour to produce manually in rough outline.

In the United States, computers have been used merely to collate passenger loading information, and to print out the final documents after the timetable has been compiled mainly by hand. Nothing is known of similar developments anywhere else in the world to those now being under-

taken by the L.T.E.

Much work remains to be done before more complex operating timetables can be compiled by computer, but the L.T.E. is hopeful that the "EMIDEC" will enable schedules and related statistical information, vehicle time cards and inspectors' time books to be produced much more quickly and economically than by manual methods. It should also be possible to compile timetables more closely in line with the fluctuating needs of users. The computer would also deal with special traffic conditions which arise from time to time, such as during Wimbledon tennis tournament and the F.A. cup final.

Experimental compilation

To gain an insight into the problem, the simplest type of bus route—from A to B, without any intermediate turning points or branches—was taken as a basis, and the logical rules underlying the compilation of a timetable for such a route were determined. From these rules, a detailed computer

programme was built up. Such work necssitates precautions to eliminate unreasonable alternative solutions.

This programme needs to be written only once, as it will accept variations in specifications for different routes. The computer can then compile the complete timetable for a particular route in 10 sec., and immediately print out the information in as many different forms as are needed. There is an even greater saving in time when producing the subsidiary documents than there is in printing the time schedule.

Complex timetables

The next problem is to define the logic and write the computer programmes for the more complex types of timetable, comprising several intermediate turning points, two or more garage allocations, and inter-working requirements where several routes follow the same path over parts of their respective journeys.

This will be more difficult, but the experience gained so far with EMIDEC will prove valuable by pointing the way to solutions of the more complex problems. It is expected that the gain in speed of schedule compilation will increase as the schedules become more complicated.

Landslips on Eastern, Southern, and Western Regions

It is expected to be up to a fortnight before repairs are completed to rail damage caused by a landslip on December 27 affecting the Southern Region track between Hook and Winchfield on the main line between Bournemouth and Waterloo. The slip involves 10,000 tons of earth. During the day trains could run only slowly, and there were considerable delays to some services.

One of the four sets of lines was suspended for 50 yd. over a 40-ft. drop. The rails and their sleepers were intact but were unsupported. The sliding earth smashed two of the three arches of a culvert carrying a stream under the line.

Dammed water flooded the meadows and a trench was dug from the stream to the river Whitewater to drain off the surplus. Thousands of tons of clinker and earth will be needed to fill in the crater.

Paddington-Birmingham line

Normal working was resumed on December 29 on the Western Region main Paddington-Birmingham line at Fenny Compton, near Leamington Spa, after a landslip there on December 27. The 9 a.m. Paddington-Birmingham-Wolverhampton train was cancelled on December 29 to ease traffic and other services were up to 20 min. late.

All train services were running normally again on December 29 on the two Eastern Region lines in Essex which were blocked by derailment of four wagons at Chadwell

Heath on Tuesday.

Two derailments at the Wimbledon Park sidings of Southern Region early on December 29 caused train delays because electric stock was hemmed in. London Transport trains were not affected. The first derailment was set right by 6 a.m. Ten suburban services were cancelled as a result of the second mishap, which occurred about 7 a.m. when two empty electric trains collided in the sidings. Both trains were slightly damaged.

Inauguration of "Trans-Pennine" Services

Ceremonies at principal cities linked by British Railways newest multiple-unit diesel trains

Speed, reliability, and comfort, three of the main attractions of the "Trans-Pennine" inter-city multiple-unit diesel trains, were all experienced at first hand and widely commended by guests attending the inauguration runs which took place on December 29 in British Railways London Midland and North Eastern Regions. The new rolling stock was described in our August 12, 1960, issue, and some details of the improved and accelerated services which began on Monday of this week, were given in our December 30 issue.

Improved trading opportunities

The general theme of speeches made at ceremonies held at the principal cities now linked for the first time by a fast regular-interval integrated service, stressed the opportunity for business to be extended substantially between the areas concerned. The natural barrier of the Pennine Chain, separating the main centres of population on and near the 125-mile route between Hull on the Humber estuary and Liverpool on the Mersey estuary, need no longer be a hindrance to cross-country travel and the efficient development of internal trade.

Attention was drawn to one of the special facilities available to encourage businessmen to travel by rail between cities, that of the British Railways Autobritn car-hire plan. By this means self-drive motorcars can be arranged to meet passengers arriving at Hull, Leeds, Liverpool, and Manchester stations. Reservations are easy to carry out and low-cost hire rates apply. Also of great importance is the network of local railway feeder services.

Buffet service

A feature of the trains which was much appreciated by the guests was the Griddle buffet on each train. This is operated by a staff of two and can provide an immediate service of hot or cold snacks at any time, either in the buffet or in the three adjacent

compartments. A good variety of dishes includes hot griddle-cooked Aberdeen-Angus beef in toasted bread roll with butter, price 1s. 9d., or, with fried egg. 3s.

The illustration on the left below shows Mrs. Lillian Hammond, Lord Mayor of Leeds, greeting Mr. W. E. Body, Lord Mayor of Kingston-upon-Hull, after arrival at Leeds City of the Hull-Leeds-Hull special train. Immediately behind Mrs. Hammond is Mr. H. A. Short, General Manager, British Railways, North Eastern Region, and on his right is Mr. E. E. Cowell, Traffic Manager, West Riding (Yorks). The righthand illustration shows Mr. T. C. Byrom. District Passenger Manager, Liverpool, British Railways, London Midland Region, welcoming Mr. G. C. Cooper, Mayor of Warrington, at Earlestown. Behind the mayor is Mr. W. H. Hardy, District Goods Manager, Warrington, on whose immediate left is Mr. H. A. Mugliston, Divisional Traffic Manager, Merseyside & North Wales Division. Standing behind Mr. Byrom are Messrs. A. D. Cochran, District Operating Superintendent, Liverpool Lime Street, and J. Davies, Stationmaster, Earlestown.

Parliamentary Notes

Reactions to new railway plan

Mr. Francis Noel-Baker (Swindon—Lab.) sent the following statement to the Swindon Borough Labour Party on December 20:—

"Today's death sentence to the British Transport Commission will bring little cheer to railway managements or railway workers. The new setup will put the railways at the mercy of a malicious Minister and of Civil Servants unqualified to run a transport undertaking.

"Political interference will be even worse than before. But Parliament will still be baulked of any effective say about how Mr. Marples runs our railways. So the 'Marples-must-go' campaign will grow louder every day; even though Mr. Marples is really only his bosses' yes-man. The man who matters is not Mr. Marples but Lord Mills (Paymaster-General). He only stayed on in the Government after his time was up because he wanted to be in at the kill of the B.T.C.

"Railwaymen will not be dazzled by Tuesday's big write-off of the railways' so-called 'debts.' Sooner or later that had to come. The longer you waited, the more you had to write off in the end.

"Killing the B.T.C. is a backward step. It is one more move away from a planned and integrated transport system which alone could give British passengers and freight a cheap, efficient service."

Staff & Labour Matters

N.U.R. pay claim

The National Union of Railwaymen has invited the other railway trade unions (T.S.S.A. and A.S.L.E.F.) and the Confederation of Shipbuilding & Engineering Unions to join it in talks with a view to formulating a new pay claim covering salaried staff, conciliation grades, and workshop staff on British Railways and also for comparable grades in other branches of the Commission's activities.

The scheme is designed to keep railwaymen's wages in line with outside industry—a principle accepted following the findings of the Guillebaud Committee last year. The unions allege that, since the last increases, which were back-dated to January, 1960, the wages of railwaymen have fallen behind once more.

Bid for shorter rail hours

The three railway unions are to make a second attempt to secure a four-hour cut in the working week of their 500,000 members. Their claim, submitted 10 months ago and rejected by the British Transport Commission in August, will be presented to the Railway Staff National Council at its meeting on February 17. The demand, which would cost about £30 million a year, is additional to the N.U.R.'s proposals that leaders of all three unions should discuss the submission of a new pay claim.



Mayoral reception at Leeds on arrival there from Hull of the "Trans-Pennine" special train



Mr. T. C. Byrom welcoming the mayor of Warrington when one of the diesel trains called at Earlestown on its inaugural run

CONTRACTS AND TENDERS

Diesel railcars for the Jama'ca Government Railway

Metropolitan-Cammell Carriage & Wagon Co, Ltd., has received an order for 17 diesel railcars from the Jamaica Government Railway. The contract provides for 12 second class cars seating 83 passengers, and five composite cars seating 20 first class and 58 second class passengers with a small buffet to provide light refreshments. Each car is powered by a Rolls-Royce six-cylinder engine with Twin-Disc type transmission driving through both axles of one bogie. There is one driving cab only but the controls are arranged for multiple operation and end doors are fitted for through communication.

British Railways, North Eastern Region, has placed an order with T. G. Construction Co. Ltd., a member of the Tarmac group of companies, for the construction of two control buildings, for up yard and down yard control respectively at Newport Yard, near Middlesbrough. The contract is valued at some £75.000.

The Mitchell Construction Co. Ltd. has been awarded a further contract valued at some £60,000 for the construction of three pre-stressed pre-cast concrete bridges at Lamesley Marshalling Yards for British Railways, North Eastern Region.

British Railways, London Midland Region, has placed the following contracts:

W. H. Heywood & Co. Ltd.: patent glazing for proposed diesel repair shop at Motive Power Depot, Birkenhead South Edward Wood & Sons Ltd.: reconstruc-

tion of lift shafts and provision of new substation at Chester General Station

J. Rata & Co. Ltd.: renewal of roof coverings over platforms 1 and 2 at Rugby Midland Passenger Station

Stewart & Gray Limited: supply and delivery of vitreous enamelled panels for pre-fabricated buildings between Liverpool and Crewe

Saunders & Taylor Limited: renewal of unit heaters on steam heating at Machine & Erecting Shop, Locomotive Works, Crewe

The Butterley Co. Ltd.: fabrication and delivery of steel work for bridges 61, 112 and 134 on the Trent Valley line.

British Railways, Eastern Region, has placed the following contracts:

Vic Hallam Limited: provision of twostorey prefabricated timber office block at St. James Bridge, Doncaster

Charles R. Price: reconstruction of underline bridge No. 4 between Old Leake (Goods) and Eastville

W. & C. French Limited: reconstruction of portion of superstructure of underline bridge No. 6 between Peakirk and St. James Deeping

Charles R. Price: provision of new roadways, drainage, loading docks, fencing gates and petrol storage and distribution facilities for the new District Engineer's and Signal Engineer's Workshops at Marshgate Yard, Doncaster

Air Pumps Limited: supply and delivery of six mobile air compressors

Charles R. Price: demolition of certain buildings, paving of areas inside and adjacent to stores buildings and provision of wagon turntable foundations and new gates at Doncaster Locomotive Works

Haines & Sheppard Limited: supply, delivery and erection of an electrical installation at the new Carriage Servicing Depot. East Ham

Wellerman Bros. Ltd.: demolition of existing building and provision of foundations and drains, for new pre-fabricated timber office block at St. James Bridge, Doncaster

W. & C. French Limited: construction of tank bases, pump house, fuelling bases, canopies and drainage at Ipswich Station

Thomas Fletcher & Co. Ltd.: reconstruction of Harringay Viaduct overline bridge No. 23 over main, suburban and goods lines between Harringay (West) and Hornsey.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Victoria :

10 diesel-electric locomotives, 900-1,000 h.p. The continuous rating tractive effort at the wheels should be not less than 28,000 lb. The maximum speed required is 60 m.p.h.

The issuing authority is the Secretary, Victorian Government Railways, Railways Administrative offices, Melbourne, C.I., to whom bids should be sent. The tender No. is 61.864. The closing date is February 1, 1961. The Board of Trade reference is ESB/33690/60.

From India:

Equipment, technical supervision and maintenance of installation for one year of mechanised hump yard at Andal.

The issuing authority is the General Manager, 17, Netaji Subhas Road, Calcutta. The tender No. is ER/UDL/HUMP/11. The closing date is April 20, 1961. The Board of Trade reference is ESB/33805/60.

From Formosa:

413 steel tyres for locomotives, various sizes from 485 x 114 x 620 mm., to 675 x 127 x 830 mm. with and without flanges.

The issuing authority is the Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan, to whom bids should be sent. The tender No. is CP4B-712. The closing date is January 24, 1961. The Board of Trade reference is ESB/3149/60/ICA.

From Pakistan:

2 10 kW. diesel engine-driven generating sets, complete with auxiliaries and switchgears as per specification No. EB-EE/45A. The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P3/HA/61/60. The closing date is January 17, 1961. The Board of Trade reference is ESB/33358/60.

3 diesel engine-driven generating sets (3 x 10 kW.) complete with auxiliaries and switchgears as per specification No. EB-EE/45B.

The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P3/HA/63/60. The closing date is January 18, 1961. The Board of Trade reference is ESB/33357/60.

2 10 kW. diesel engine-driven generating sets complete with auxiliaries and switchgear as per specification No. EB-EE/45.

The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P3/HA/60/60. The closing date is January 16, 1961. The Board of Trade reference is ESB/33365/60.

2 transformers, 30 kVA.

2 switchgear h.t.

1 l.t. switchboard as per specification No. EB-FF/48.

The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P3/HA/71/60, The closing date in January 19, 1961. The Board of Trade reference is ESB/33360/60.

386 automatic door switch (plunger type) finished oxy, copper as per drg. No. 87028, Compagnie General de Construction, 185, Rue Parise, item No. 7 (DSW/1) ordinary.

The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P3/HB2/46/60. The closing date is January 21, 1961. The Board of Trade reference is ESB/33361/60.

2 electric motor-driven air-cooled refrigeration compressor with accessories as per specification No. EB/EE41.

The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P3/HA/70/60. The closing date is January 19, 1961. The Board of Trade reference is ESB/33363/60.

From South Africa:

9 four-wheel, petrol-engine, pneumatictyre industrial type fork-lift trucks, lifting capacity of 4,000 lb. at a 24-in. load centre, complete with load safety racks 48 in. high, in accordance with the specification No. Auto 55/1959.

The issuing authority is the Stores Department, South African Railways, to whom bids should be sent. Local representation is essential. The tender No. is F.8524: Fork Lift Trucks. The closing date is January 20, 1961. The Board of Trade reference is ESB/33684/60.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

Notes and News

Accident at Pyle, Glam. We regret that two serious errors occurred in our account in this section last week of the accident at Pyle, Glamorganshire, in the Western Region of British Railways. The accident occurred at 11.20 p.m. on December 17, and not October 17, as stated, and the line was clear about four hours later.

Derailment caused by diversion. Eight people were injured at Puyallup, Washington State, U.S.A., on December 29, when a train carrying 500 passengers to a football match was derailed while being diverted to avoid an earlier accident.

Railway Students' Association visit. On January 27-29, the Railway Students' Association will visit the London Midland Region Crewe-Manchester electrified line. The party will leave London on the evening of January 27 and stay that night in Manchester.

Track damaged by derailment. Four wagons of the 3.51 p.m. parcels train from Liverpool Street to Parkeston Quay, Harwich, British Railways, Eastern Region, were derailed at Chadwell Health on December 27. Electric trains between Liverpool Street and Gidea Park were suspended while the track was repaired.

Early morning ticket concessions in the Southern Region. British Railways, Southern Region, is to reprieve the abolition of early morning tickets to London in some areas of the Region. This will only be done where the service is economical. Among the places which will enjoy this concession are Aldershot, Rochester, Lewes, and Brighton. A full list has not yet been published.

Response to Argentine Railway tender. In response to the Argentine State Railways' call for tenders for the supply of 3,000 goods wagons of different types at an estimated

total cost of £13 million, the only United Kingdom bid was from Metropolitan Cammell Carriage & Wagon Co. Ltd., of Birmingham. The 24 other bidders include South African, United States, Belgian, Dutch, Austrian, German, Japanese, Spanish and Argentine companies.

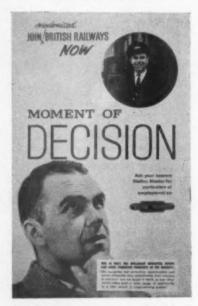
Rail holiday bargains. British Railways is to offer a wide range of travel bargains for holidaymakers next summer. These will include mid-week period return tickets at 5s. in the £ less than ordinary fares; "Railrover" tickets offering unlimited travel throughout the country at attractive rates; holiday "Runabout" tickets providing lowcost travel within a specified holiday area; and circular tour tickets offering a saving of 2s. in the £. There will also be an extensive programme of excursions to holiday resorts and other centres at rates below the normal fares. Every effort is to be made to encourage party travel next summer and already booklets have been produced outlining ideas for outings and sight-seeing tours, including combined rail-road-steamer tours.

Aberdeen/Inverness diesel expresses. For the purpose of testing full potential, the limited-stop express diesel services between Aberdeen and Inverness will be continued right through to the end of the winter timetable. (June 10 for this service). These trains have a reputation for punctuality, and the Scottish Region hopes that they will win back passengers from the roads. They are equipped with miniature buffets providing both hot and cold food.

British Railways employees at F. Perkins Limited. Among those who have attended courses recently at the service school of F. Perkins Limited, Peterborough, are three automotive-engine fitters of British Railways, Western Region. In the accompanying illustration they are shown carrying out valve-tappet adjustments on a Perkins high-speed diesel engine specially arranged in a rotatable

mounting in a classroom at the school. They are, left to right, Messrs. A. Bartlett, A. G. Dauncy, and H. Start, from the Western Region Road Motor Engineer's depots at Wolverhampton, Hockley, and Plymouth respectively. Each year more than 3,000 students, half of them from overseas, attend the school to study the three products of the Perkins Group, diesel engines, two-stroke petrol engines for outboard marine service, and gas turbines. Instruction is free to the students who spend from two days to six months with the company.

BRITISH RAILWAYS STAFF RECRUITMENT



A staff recruitment poster produced by the Public Relations & Publicity Department of British Railways, Western Region, in support of a 13-week recruiting campaign.

Orders for British Transport Advertising. The Plastics Division of the Imperial Chemical Industries Limited has placed a contract for three years advertising with British Transport Advertising. The subject of the advertisements will be Alkathene. Among other advertisers who have booked spaces for periods of display varying from three months to three years, are Johnson & Johnson Limited, A. S. Jenkinson (Caravans) Limited, Potter & Clark Limited, the Ardath Tobacco Co. Ltd., Rosedale Products Limited, Biro Swan Limited, and the Pearl Assurance Co. Ltd.

Lost property charges. Travellers who accidentally leave their property on London Transport Executive buses or trains will have to pay more in future to recover it. Mr. Ernest Marples, Minister of Transport, has made regulations which come into force on February 1, authorising the L.T.E. to increase its basic charge of 6d. per £1 value of lost property to 1s. per £1, payable when the property is reclaimed. The 6d. basic charge has been in force since 1933. Rising costs have made it necessary of recent years to subsidise the lost property department more



Automotive-engine fitters of British Railways, Western Region, studying diesel maintenance work at F. Perkins Limited service school

and more heavily from fares. In addition to the basic charge, claimants of property valued at more than £1 can also be called upon to pay a "reward" to the staff benefit fund of up to one-tenth of the value of the property. This provision has been carried over unchanged from the previous regulations. Before making the new regulations, the Minister consulted the Central Transport Consultative Committee, the Trade Unions and other bodies concerned.

18 hurt in bus smash. Eighteen people, mainly passengers, were injured when a bus and a lorry were in collision in Wilton Road, Victoria, London, last week. The bus then veered across the road and into a shop window.

Resumption of full services on North-East London lines delayed. Full services on the North-East London electrified lines of the Eastern Region of British Railways were not resumed last Monday as had been hoped. After a series of failures 50 of the 71 three-and four-coach units were withdrawn. A target date of January 2 was set for the resumption of full services, but the modifications to the stock preclude this.

Tilbury-Gravesend ferry service alterations. British Railways, Eastern Region, has announced that before the introduction of new passenger ferry vessels early in 1961, the pontoon at Gravesend Town pier will undergo structural alterations, This work will commence on January 9 and will last for about three weeks, during which time the pier will be closed. All ferries will run to and from Gravesend West Street car ferry pier on a restricted basis for this period.

British Oxygen staff training college. The British Oxygen Co. Ltd. is to open a staff training centre at Chartridge Lodge, near Chesham, Buckinghamshire, this month. At first, priority will be given to the senior and middle levels of management. As the college develops a wider field is to be covered, and it is hoped to start courses for foremen and supervisors by the end of 1962. Courses, which will all be residential, will vary in length from two to four weeks, and the work of the college will supplement other management development and training plans.

Cross Channel motor ferries. British Railways, Southern Region, has announced plans to carry more holiday motorists across the Channel next year. Car ferry services in and out of Dover, run by British Railways, French National Railways, and Belgium Marine, will be able to handle up to 5,500 motorcars, an increase of 1,500, every 24 hr. during the peak holiday period. At the Victoria headquarters of the Continental car ferry services, an automatic reservations machine has been loaded with 750,000 cards, each one representing a vehicle space between March 1 and October 31.

Increase in October visitors to Britain. The number of overseas visitors to Britain in October was 112,675, 12 per cent more than in October, 1959. More than 1,500,000 tourists visited this country in 1960, with the totals for November and December still to be added. Visitors from Europe in October totalled 48,210, an increase of 13 per cent on the same month last year. European

countries registering the largest percentage increases were Spain, 34; Denmark, 33; France, 21; Austria, 19; and Portugal, 18. United States visitors during the month numbered 30,980, a 33 per cent increase, and Central and South American countries showed an increase of 38 per cent.

Escalator breakdown at Holborn. A defective escalator at Holborn Station, London Transport Executive, caused delays during the evening rush-hour on December 29. The barriers were closed, and many passengers had to wait nearly half-an-hour to catch their trains.

Bicycle on line. A bicycle thrown on the electric railway line at Chiswick last week, stopped services on the Southern Region line between Waterloo and Hounslow. The bicycle short-circuited the current and became welded to the line. Police searched the area on both sides of the track. Railway engineers freed the bicycle from the line with acetylene cutters.

Steel workers on four-day week. Because of a temporary fall in demand for tinplate, some 4,000 workers at the Steel Co. of Wales Ltd. are to go on a four-day week. From the beginning of this week workers at Trostre and Velindre, near Swansea, have operated a 16-shift week instead of the normal 20, and 12 shifts instead of the normal 16, are being worked at the Elba Works, Swansea, and the Burry Works, Llanelly.

North Eastern Railway Association. The first meeting of the recently founded North Eastern Railway Association will be held at York on March 11-12. The objects of the Association are to foster interest in the North Eastern Railway, to circulate information regarding all spheres of the railway and to stimulate interest in the modelling of the North Eastern Railway and its constituents. Full details of the Association and its meeting are available from Mr. R. J. Hunter, 7, Almery Terrace, The Esplanade, York

Roadside advertising sites at Ilford. Four new poster advertising sites, two 48 and two

16 sheets, have been created by British Transport Advertising, near Ilford Station. It is estimated that 16,000 vehicles a day as well as 35,000 pedestrians pass the new sites, which face Ilford Broadway. Carefully spaced along a 70 ft. frontage to give maximum impact and at the same time preserve the amenities of the locality, the sites have a wide surround painted cream with black moulding.

Train door open. A 45-year-old man was found dead on December 29 by railway staff to the north of Knebworth, Hertfordshire, after a passenger on the 5.15 p.m. Hull-Kings Cross train had told the guard that a door was open as it passed through Potters Bar tunnel.

Bus embedded in house. Some families were ordered from their homes in Station Street, Ilkeston Junction, Derbyshire, on December 28 after a bus without passengers skidded and crashed through the front room of a house, wrecking this home and endangering adjoining houses. The bus, which was embedded in the house, could not be moved until workmen had put in supports to hold up the ceiling of the front room.

Expansion of travel. Mr. Charles Holt, Managing Director of Thos. Cook & Son Ltd., on December 29 described travel as the new industrial giant which had shown the most dynamic growth of any industry in the world in the past few years. He was speaking at a press conference in London. Mr. R. A. Smyrk, Assistant General Manager of the company, said Paris remained the greatest single attraction for British people holidaying abroad, with Spain a close second. Prices for holidays abroad next year will be about the same as for 1960.

Associated Commercial Vehicles Limited foreast. In a circular to ordinary stockholders concerning the proposed rights issue of one for one at 30s. a £1 share, Lord Brabazon of Tara, Chairman of Associated Commercial Vehicles Limited, says that it is estimated that current year profits will be not less than those earned for 1959–60. Subject to any unforeseen circumstances and pro-



New advertising sites at Ilford

vided no material deterioration in trading conditions takes place, the directors expect group profits for the year should enable them to pay an interim ordinary dividend of 5 per cent on the increased capital and to recommend a final of 11 per cent. It is proposed that the authorised share capital be increased from £3,800,000 to £6,000,000 by the creation of 2,200,000 new £1 ordinary shares.

Safe driving awards. A presentation of safe driving awards was made on December 22, to 39 British Railways goods & parcels motor drivers from Glasgow Stations who have driven for five years and longer without accident. Mr. George MacLean, Assistant Chief Constable, City of Glasgow Police, presented the medals and other special awards won in this annual safe driving competition promoted by the Royal Society for the Prevention of Accidents.

Apprenticeship awards. At a short ceremony attended by directors of the Teddington Group of Companies, Sunbury, 18 boys received indenture certificates of completed apprenticeship from Mr. E. Ower, a director of the parent company, the British Thermostat Co. Ltd. The apprenticeship committee found selection of the best apprentice of the year most difficult. This year the prize of 25 guineas awarded annually by the directors, was divided between S. Whittle and J. Benham.

Railway Stock Market

The firmer trend with which stock markets closed the old year gave way to more uncertain conditions, and 1961 opened with renewed caution, because of fears of a serious turn in international affairs following the developments in Laos. There was no heavy selling, though on the other hand, buyers showed renewed caution, and share prices tended to move lower.

Among foreign rails, Antofagasta ordinary stock eased from 16½ to 16½ though the preference stock remained at 33½. United of Havana second income stock was again 6, and San Paulo Railway 3s. units kept at 1s., but with very little business passing in the foreign railway section, most quotations were scarcely tested. Mexican Central "A" bearer debentures held at 59½.

Elsewhere, Costa Rica ordinary stock was 33½, with the first debentures 96 and the second debentures 112. Chilean Northern first debentures changed hands at the slightly lower level of 52½. Brazil Railway bonds were easier at 4½, but in other directions, Paraguay Central prior debentures remained active with dealings ranging from 15½ to 17. Guayaquil & Quito assented bonds were 55. International of Central America common shares were \$18 and the preferred stock \$105½.

Nyasaland Railways shares kept at 9s. with the 3½ per cent debentures 37½. Midland of Western Australia were 6½, West of India Portuguese 110½ and the 5 per cent debentures 95. Barsi ordinary stock again had a quotation of 17½.

In the locomotive building and engineering sections, Beyer Peacock 5s. shares remained at 6s., Charles Roberts 5s. shares were 8s., compared with 8s. 3d. and Westinghouse Brake rallied from 39s. 73d. to 40s. 73d. A sharp advance of 2s. 3d. in Gloucester Wagon

10s. shares to 13s. 3d. was accompanied by vague take-over rumours. Later the rumour was denied by the Chairman and the shares came back to 12s. 7½d. Wagon Repairs 5s. shares were steady at 18s. 6d. G. D. Peters 15s. 7½d., North British Locomotive 6s. 6d. and Birmingham Wagon 26s. 6d.

General Electric strengthened slightly from 29s. 3d. to 29s. 6d. awaiting news of the company's plans under the new chairman. A.E.I. eased from 40s. 3d. to 40s. and English Electric Slightly firs. 235.

tric rallied from 34s. 7½d. a week ago to 35s.
Elsewhere, T. W. Ward were 65s. 9d.
compared with 64s. 9d. a week ago, British
Oxygen 5s. units moved up from 25s. 9d. to
26s. and Tube Investments were well maintained at 74s. Pollard Bearing 4s. shares
kept at 29s. 9d. and Ransome & Marles
5s. shares were 15s. 6d. "ex" the free scrip
issue. Pressed Steel 5s. shares gained a few
pence at 25s. 3d. Dowty Group 10s. shares
kept at 34s. 6d. and Leyland Motors shares
strengthened to 80s. 6d.

Vickers have been firmer at 28s. 9d., Stone-Platt were 55s. Ruston & Hornsby at 27s. were virtually the same as a week ago. Renold Chain were 34s. 6d. and B.I. Cables rallied to 49s. 7½d., while Mather & Platt were 43s. and there has been selective buying of shares of machine tool companies, among which Alfred Herbert were 50s. 6d., Craven Bros. 5s. shares 9s. and Coventry Gauge 10s. changed hands around 23s.

Steel shares were upset by the news of short time working in the tinplate section of Steel Co. of Wales, whose shares dropped sharply to 39s. 9d. United Steel were 70s. 3d. and Dorman Long 40s. 6d.

Forthcoming Meetings

January 7 (Sat.). Railway & Canal Historical Society, North Western Group. Meeting, at Oddfellows' Institute, Stockport, at 6.30 p.m. "Architecture of the Canals," Dr. C. T. G. Boucher.

January 9 (Mon.). The Institution of Electrical Engineers, Electronics & Communications Section, at Savoy Place, London, W.C.2, at 5.30 p.m. "Recent Research in Thermionics," Mr. G. H. Metson.

January 9 (Mon.). The Institute of Transport, at 66, Portland Place, at 5.45 p.m. "Organisation," Mr. H. C. Johnson.

January 9 (Mon.). The Institution of Mechanical Engineers, at 1. Birdcage Walk, London, S.W.1, at 6 p.m. Internal Combustion Engine Group Discussion.

January 10 (Tue.). British Railways Bristol Lecture & Debating Society, at Staff Association Building, Temple Meads Station, at 6 p.m. "The M.1 Motorway," Mr. Holliday.

January 10 (Tue.). The Institution of Civil Engineers, at Great George Street, London, S.W.1, at 5.30 p.m. "The Loading of Light Railway Tracks," Mr. J. M. Kesson.

January 10 (*Tue.*). South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, at Cardiff. Joint debate with London Society.

January 11 (Wed.). The Permanent Way Institution, London Section, at British Transport Commission, Marylebone Road, London, N.W.1, at 6.30 p.m. Quiz.

January 11 (Wed.). Institution of Railway Signal Engineers, at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, at 6 p.m. "Automatic Marshalling Yards," Mr. J. C. Kubale.

January 12 (*Thu.*). The Institution of Civil Engineers, at Great George Street, London, S.W.I, at 5.30 p.m. Informal discussion: "The Achievement of Economy by Improved Design and Materials for Track and Railways Structures."

January 12 (Thu.). British Railways, London Midland Region, Lecture & Debating Society, at the Clerical Staff Dining Club, Euston. Debate with B.R. Southern Region Lecture & Debating Society. "That the Present Methods of Rolling Stock Distribution are Inefficient and Obsolete."

January 12 (*Thu*.). The Institute of Metals, at 17, Belgrave Square, London, S.W.I, at 6.30 p.m. "Metallurgical Research at High Pressures," Dr. J. E. Hilliard.

January 12 (Thu.). British Railways, London Midland Region, Lecture & Debating Society, East Lancashire Division, at Bury. "The B.T.C. Fire Organisation and Fire Prevention at Work and at Home," Mr. L. W. Tetley. January 13 (Fri.). The Institution of

January 13 (Fri.). The Institution of Electrical Engineers, Utilisation Section, at Cafe Royal, at 7 p.m. Section Dinner Dance.

January 13 (Fri.). British Railways, Southern Region, Lecture & Debating Society, at Battersea Town Hall. Annual Social & Dance.

January 14 (Sat.). Railway & Canal Historical Society, at the London Transport Executive Library, London, S.W.1. "The Railways of the Forest of Dean," Mr. H. W. Paar.

January 14 (Sat.). The Permanent Way Institution, East Anglia Section, at Cambridge, at 2.15 p.m. Paper to be arranged.

OFFICIAL NOTICES

A GENTS, Senior and Junior Site Engineers required for Railway construction contracts in various parts of the country. Must be experienced in the use of surveying instruments and capable of controlling projects. Position is permanent with Pension Scheme and car to Senior Engineers.—Apply Eagre Construction Co. Ltd., East Common Lane, Scunthorpe.

ASSISTANT TO THE RAILWAY ENGINEER required by large Steel Works, to prepare and implement schemes for new track layouts, diesel locomotive repair shops, etc. Permanent position for man age 24/35 with opportunity to gain practical experience including routine maintenance. Must be able to prepare accurate railway layout drawings. Asalary commensurate with the age and qualifications of the applicant will be paid, also assistance with removal expenses and temporary lodging allowance. Pension scheme and staff canteen facilities available. Apply to Personnel Manager, Round Oak Steel Works, Brierley Hill, Staffs.

Foreign Employment ROADMASTER

ENGINEERING GRADUATE preferred; minimum of two years engineering training essential.

mum of two years engineering training essential.

Require two years varied railroad engineering service, or five years in direct charge of track crews. Will supervise 135 men maintaining 45-mile railroad assign work, order materials, be responsible for safety, make regular detailed inspections of roadbed and all track on main line, sidings and yards, bridges, tunnels, etc. Will make engineering calculations relating to maintenance and use of structure and equipment. Must speak Spanish. Married or single candidates acceptable.

Excellent opportunity large copper company,

Excellent opportunity large copper company, Chile, South America. Two year contract with transportation both ways for you and family, Basic salary \$25.00 to \$650.00 per month depending upon age and experience of applicant.

Box 6, The Railway Gazette, 33 Tothill Street, S.W.1.

TIRELLI TENERAL

GABLES

More than equal to the service demanded

ORDER FROM THE

9.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2



Continuous performance!





continuous cast rods and tubes

CUT COSTS FOR PHOSPHOR-BRONZE BUSHES AND BEARINGS

Continuous cast phosphor-bronze rods and tubes by the 'BIRSO' technique offer considerable advantages in cost and superior physical properties.

Since the rods and tubes are supplied in exact lengths up to 12 ft, there is negligible waste of bar ends.

Porosity is entirely eliminated.

Greater impact strength, rensile strength, yield stress hardness, better fatigue characteristics, and improved uniformity.

Phone or write for complete specifications of our continuous cast phosphor-bronze rods and tubes together with details of our precision machined bushes and bearings in any quantity.

CONTINUOUS CAST PHOSPHOR-BRONZE RODS AND TUBES

Round Solid Rod from | in. dia. to 2\frac{1}{2} in. dia.

Round Cored Rod from 1 in. o.d. x 1 in. i.d. to 21 in. o.d. x 2 in. i.d.

Minimum wall thickness \u00e4" all in 12 foot lengths.

NON-FERROUS AND HIGH DUTY IRON CASTINGS-FROM A FEW OUNCES TO 10 TONS IN QUANTITY OR ONE-OFF SPECIALS!

T. M. BIRKETT, BILLINGTON & NEWTON, LIMITED

HANLEY AND LONGPORT . STOKE-ON-TRENT . ENGLAND

Hanley, Phone: Stoke-on-Trent 22184/5/6/7.

Longport, Phone: Newcastle, Staffs 51433/4.





STAINLESS STEEL FABRICATORS

* Pressure Vessels (X-ray inspections)

* Storage and Transport Vessels

* Condensers and **Heat-Exchangers**

> * Pipework and **Pipefittings**

> > * Holloware

* Sheet Metal Work





The inner stainless steel tanks and steam heating coils of twenty-five of the tanks wagons illustrated, were recently made at our works to the orders of a well known wagon manufacturer.

RING ROAD, LOWER WORTLEY, LEEDS 12 London Office: 14 GREAT PETER STREET, LONDON, S.W.1

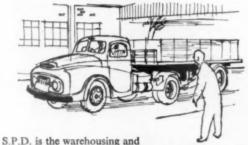
UNILEVER COMPANIES

use

BRITISH RAILWAYS

Modern Freight Services

Unilever Companies transport many tons of their raw materials and finished products with the help of British Railways. There are more than 800 Express Freight trains time-tabled every weekday, many giving next morning arrivals over long distances. From many towns British Railways Export Express services give assured next-morning delivery for wagon-load traffic to London Docks (Royal, India & Millwall Groups), Merseyside, Manchester, Goole, Grimsby, Hull, Glasgow & Grangemouth. Charges are fully competitive: ask your local Goods Agent for details.

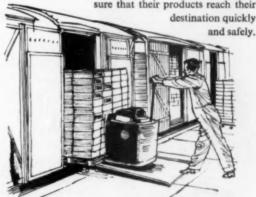


distributing associate of Unilever Ltd. Many of its depots are connected with rail sidings and take delivery direct from British Railways pallet vans.

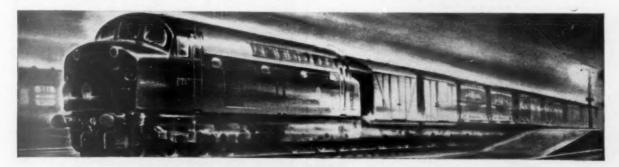


Birds-Eye Foods Ltd. quickfreeze a variety of foods which are carried across the country in British Railways refrigerated containers specially designed for the purpose, ensuring that the foods are kept in perfect condition.

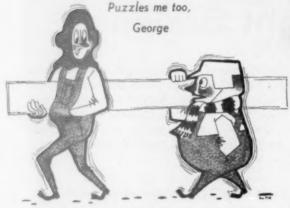
Van den Berghs & Jurgens Limited make a wide variety of margarines and cooking fats which are delivered by British Railways pallet vans to S.P.D. depots throughout the country. By using British Railways, Van den Berghs & Jurgens Limited, like other Unilever Companies, ensure that their products reach their



BRITISH RAILWAYS



Go on, George
... why they don't have Parkinson-Schwank
Overhead Radiant Heaters in every Factory.
Why they don't have what, George?
These things that keep the
perishing place warm, Fred!







This is part of an installation of Parkinson-Schwank Heaters in a Foundry. Installed by Northern Gas Board.

Parkinson-Schwank overhead radiant heaters are being installed in factories, foundries, and workshops, all over the country. Why? Because they're safe. Cheap to run. They warm a place right through and you can turn them on and off like a light.





(A Division of Parkinson Cowan Ltd.)

DOLPHIN WORKS, FITZALAN STREET, KENNINGTON ROAD LONDON, S.E.11 Telephone: RELIANCE 2406

Thomas Turton **SPRINGS** of every description for Rail and Road Transport Established over a Contury HIGH SPEED and ALLOY TOOL STEELS THOMAS TURTON & SONS LTD SHEAF WORKS SHEFFIELD 4 Telephone SHEFFIELD 25171-2-3 Telegrams TURTONS, SHEFFIELD 4

NOW READY!

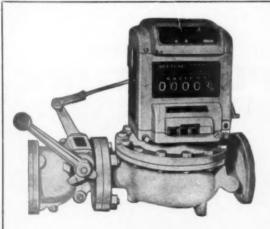
catalogue

The superb new King Dick catalogue is packed with full details of precision-made hand tools for the Railway Industry. It is an ideal work of reference and no one can afford to be without it. Write now for your copy.

SEND NOW!



ABINGDON KING DICK LIMITED, Abingdon Works, Kings Road, Tyseley, Birmingham 11



- ★ Push Button Batch Control for OIL Refuelling
- ★ Pre-Setting Automatic Cut Off
- ★ Ticket Printing

Write Today for details

CLEVELAND METERS LTD REDCAR · YORKSHIRE

To:-	CLEVELAND	METERS	LIMITED	
	REDCAR,	YORKSHIRE		

(A Subsidiary of Neptune Meters Ltd., Canada)

NAME.

ADDRESS

Dept. R.I

FASTENINGS



GEORGE COOPER & SONS EFFINGHAM NUT & BOLT WORKS

High Strength



for Structural Joints

Send now for details of this new fastening method and its applications.



Altrincham Street, Manchester, I. Telephone: ARDwick 1765

LONDON: W. Kelway-Bamber & Co. Ltd., Room 7 70 Victoria Street, S.W.1. Telephone: Abbey 6860

N.E. COAST: Fasteners Ltd., 2 Hall St., Barnard Castle County Durham. Telephone: Barnard Castle 3143

PERMANENT WAY MARCROFT WAGONS LIMITED

For All Classes of

RAILWAY WAGON WORK RAIL TANK CARS & HOPPERS

> CHIEF OFFICE GLOUCESTER PLACE, SWANSEA Swansea 53128

> > PRINCIPAL WORKS

AT

BURRY PORT PORT TALBOT CARDIFF RADSTOCK COALVILLE **SWANSEA**

TELEPHONES

Burry Port 41 Coalville 1160 Radstock 3203 Cardiff 46281 Port Talbot 3212 Swansea 54950

Subsidiary Company:-

MARCROFT ENGINEERING LIMITED

Thornborough Works, Coalville, Leies. Also at Cardiff and Port Taibot

BUYING NEW FURNITURE?



VISIT THE FURNITURE SHOW

EARLS COURT

FEB 1 to FEB 11 Trade Preview JAN 30-31





JOHN MACDONALD & CO. (Pneumatic Tools) LTD. Pollokshaws . Glasgow, S.3.

On the right lines...

... with B.E.N. equipment for a better - quicker - lower cost job. On all railway

maintenance work use B.E.N. spray painting equipment and pneumatic tools.





COMPRESSED AIR ENGINEERS

Write for details or for our Representative to call

B.E.N. PATENTS LTD. (Division of Broom & Wade Ltd.) Dept. L. HIGH WYCOMBE, BUCKS

the symbol of quality

321

The 'Airvac' Aerodynamic System of Vehicular ventilation provides a fresh and pleasant atmosphere whether you travel fast or slow. Excess extraction at high speed is automat-ically prevented so that continuous passenger comfort is assured.

Nearly 4.000 'G' type 'Airvac' Roof Ventilators were supplied for the nev electric multiple-unit stock for the Glasgow Suburban Services. These units were built by the Railway Division of the Pressed Steel Co. Ltd.

Beacon House, Kingsway, London W.C.2 Chancery 8135 (4 lines) 'Grams 'Airvac' London.





INDEX TO ADVERTISEMENTS

A.I. Electric Welding Machines, Ltd —	Clyde Rubber Works Co., Ltd 32	Hasler Telegraph Works,	Mitchell, Shackleton & Co., Ltd	Smith, W., Gilmour & Co., Ltd.
Abingdon King Dick, Ltd. 39	Cobra (Wood Treatment),	Henderson & Keay, Ltd — Henschel Werke, G.m.b.H. —	Mobil Oil Co., Ltd	Southern Forge Co., Ltd South Wales Switchgear Co.,
Aircraft Marine Products	Cockerill, S. A., Ougree	Heywood, S. H., & Co., Ltd	Ltd Morgan Crucible Co., Ltd	S.P.E. Co., Ltd.
(Gt. Britain), Ltd —	Commonwealth Sales Cor-	High Duty Alloys, Ltd 8	Murex Welding Processes,	Spencer Moulton, George, &
Service Alidays & Onions, Ltd —	Consolidated Brake & Eng-	Hoffmann Manufacturing Co., Ltd 1	Ltd	Co., Ltd Standard Telephones &
Allen, Edgar, & Co., Ltd	ineering Co., Ltd	Howard Pneumatic Engin-		Cables, Ltd
Allgemeine Elektricitats Gesellschaft	Tool Co., Ltd	Hunslet Engine Co., Ltd		Steel, Peech & Tozer
Andre Rubber Co., Ltd — Archdale, James, & Co., Ltd. —	Conveyancer Fork Trucks	Hurtley, Fred, & Son, Ltd. — Hyde, Robert, & Son, Ltd. —	Neal, R. H., & Co., Ltd	Steels Engineering Products, Ltd 14
Armstrong Patents Co., Ltd	Cooper, Geo., & Sons 40 Coventry Machine Tool		Newton Bros. (Derby), Ltd. —	Stirk, John, & Sons, Ltd — Stone, J., & Co. (Deptford),
Associated British Machine Tool Makers, Ltd. 30, 31	Works, Ltd Cowans, Sheldon & Co., Ltd		Nippon Signal Co., Ltd —	Ltd. Stream Line Filters, Ltd
Associated Electrical In-	Craven Bros. (Manchester),		North British Locomotive Co., Ltd	Suffolk Iron Foundry (1920), Ltd.
dustries-GRS, Ltd. Associated Electrical Indus-	Cravens Limited	Illingworth, E., & Co., Ltd. —	Nuts & Bolts (Darlaston), Ltd	Sulzer Bros. (London), Ltd
tries (Manchester), Ltd 3 Associated Electrical Indus-	Crompton Parkinson, Ltd. 13	Imperial Aluminium Co.,		Summerson, Thos., & Sons, Ltd.
tries (Rugby), Ltd — Associated Electrical Indus-		Imperial Chemical Indus- tries, Ltd 25		Swift, George & Sons, Ltd. —
tries (Woolwich), Ltd 12		Intermit, Ltd International Twist Drill		Swiss Industrial Company Swiss Locomotive & Machine
Associated Lead Manufac- turers, Ltd.	Daimler Benz, A.G	Co., Ltd 6 Isca Foundry, Ltd	Oldfield & Schofield Co., Ltd	Works
Atlas-Copco A/B	Davey, Paxman & Co., Ltd. — Davies & Metcalfe, Ltd. 28, 29	Isothermos, Société Inter-	Oleo, Pneumatics, Ltd	Sylglas Company, The —
Austin Taylor Electrical, Ltd.	Dean, Smith & Grace, Ltd	nationale des Applications —	Ormerod Shapers, Ltd — Osborn, Samuel, & Co., Ltd. —	
Aviation Developments Ltd	Docker Brothers Dorman Long (Africa) Ltd. —		Ottermill Switchgear Ltd —	
	Dragonair, Ltd 10			Talbot Waggonfabrik
	Drummond Asquith Ltd	Jackson Vibrators, Inc		Tangyes, Ltd 27
0		Japan Rolling Stock Ex- porters' Assn —	P. & M. Co. (England), Ltd	Taylor Bros. (Sandiacre),
Bagnall, W. G., Ltd — Baker, John, & Bessemer,			Painut Co., Ltd., The — Parkinson Cowan Industrial	Taylor, F. & Sons (Man-
Bayliss, Jones & Bayliss, Ltd.	Eagre Construction Co.,Ltd		Products, Ltd 38 Parkinson, J., & Son (Ship-	Chester) Ltd. Taylor Rustless Fittings Co.,
Beckett, Laycock & Wat- kinson, Ltd 33	Elastic Rail Spike Co., Ltd		ley), Ltd	Tearne & Sons, Ltd 36
Belships Co., Ltd., Skibs A/S -	English Steel Corporation,	Kaye, Joseph, & Sons, Ltd Kearns, H. W., & Co., Ltd	ing Co., Ltd — Pearson Machine Tool Co.,	Tees Side Bridge & Engin-
Benjamin Electric Co., Ltd. — B.E.N. Patents, Ltd 41	E.N.V. Engineering Co. Ltd. —	Kearsley, Robert, & Co — Kendall & Gent, Ltd —	Ltd	Telephone Manufacturing
Berry, Henry, & Co., Ltd 32 Beyer, Peacock & Co., Ltd. —	Ericssons Signalaktiebolag,	Kenitra Co., Ltd	Pel, Ltd	Co., Ltd. Thermit Welding (Gt. Britain)
Beyer, Peacock (Hymek),	Eutectic Welding Alloys Co., Ltd.	King, George W., Ltd — Kisha Seizo Kaisha, Ltd —	Peters, G. D., & Co., Ltd — Pirelli-General Cable Works,	Ltd. Thomas, Richard, & Bald-
Beyer, Peacock, Railway	Expanded Rubber Co., Ltd	Kitchen & Wade, Ltd	Ltd 35 Planwell Engineering Co.,	Thomson, Thomas, Sons &
B.F.M. Exhibition 40	Eyre Smelting Co., Ltd	Klockner-Humboldt-Deutz, A.G —	Ltd	Co. (Barrhead), Ltd
Birfield Industries, Ltd		Knorr-Bremse, G.m.b. H. Krauss, Maffei A.G —	Powell Duffryn Engineering Co., Ltd 23	field), Ltd 20
Birkett, T. M., Billington & Newton, Ltd 36		Kretz, P. Ing., Dipl	Preformed Line Products (Gt. Britain), Ltd	Town, Fredk., & Sons, Ltd. — Transport Brakes, Ltd. —
Birmingham Railway Car- riage & Wagon Co., Ltd	Fairclough, Leonard, Ltd	fabriken Kugelfischer Georg Schafer	Pressed Steel Co., Ltd Provident Mutual Life	Transport Engineering & Equipment, Ltd.
Bolton Gate Co., Ltd — Bolton, Thos., & Sons, Ltd. —	Falk, Stadelmann & Co., Ltd. — Ferguson Battery Co., Ltd. —	& Co	Assurance Association —	Trico-Folberth, Ltd —
Booth, James, Aluminium	Ferodo, Ltd	Kyosan Electric Mfg. Co.		Turton, Geo., Platts & Co., Ltd.
Bowmaker (Plant), Ltd	Finlay Engineering Ltd			Turton, Thos. & Sons. Ltd. 38
Boydell, E., & Co., Ltd — B.P. Trading Co., Ltd —	Fisons Pest Centro's, Ltd. 24 Flextol Engineering Co.,		Railko, Ltd	Tyer & Co., Ltd
Bristol Siddeley Engines, Ltd. — Britannia Batteries, Ltd. —	Fowler, John, & Co.(Leeds),	Lace Web Spring Co., Ltd	Railway Signal Co., Ltd	
Britannia Iron & Steelworks, Ltd.	Ltd 44 French Railways	Lamp Manufacturing &	Ransomes & Rapier, Ltd. — Rawlings Manufacturing	
British Electrical Repairs,		Railway Supplies, Ltd — Lang, John, & Sons, Ltd 30	Co., Ltd Reyrolle, A., & Co., Ltd	United Coke & Chemicals
Rritish Ermeto Corp., Ltd		Lansing Bagnall, Ltd — Laycock Engineering, Ltd. —	Rheinstahl Siegener Eisen- bahnbedarf, A.G	United Steel Companies, Ltd. —
British Insulated Callender's Cables, Ltd		Le Carbone (Great Britain),	Richards, Chas., & Sons, Ltd.	
British Insulated Callender's Construction Co., Ltd	General Electric Co.,	Leeds Engineering & Hy- draulic Co., Ltd	Roberts, Charles, & Co.,	
British Oxygen Co., Ltd British Paints, Ltd	General Electric Co., Ltd. 35 General Motors Overseas	Levick, John, Ltd	Roberts, J. W., Ltd	
British Railways 37	Operations	Lockheed Precision Products Ltd.	Rolls-Royce, Ltd — Rozalex, Ltd —	Vacuum Brake Co., Ltd — Vokes, Ltd —
of The Timken Roller	General Steel Castings Corporation 9	Luwa, G.m.b.H		Vulcanised Fibre, Ltd
British United Traction, Ltd. —	Glacier Metal Co., Ltd 9 Gloucester Railway Carriage & Wagon Co., Ltd. —			
Brown Bayley Steels, Ltd 16	Godwin Warren (Engineer-		Sankey, Joseph & Sons	
Brown, David (Industries),	ing) Ltd	Mandonald John & Co	Ltd — Saunders Valve Co., Ltd —	
Brush Traction, Ltd 15 B.T.R. Industries, Ltd	Greenham Group Greenwood's & Airvac Ventilating Co., Ltd 41	Macdonald, John, & Co., (Pneumatic Tools), Ltd 40	Scammell Lorries Ltd	Walker, James, & Co., Ltd. 2 Ward, H. W., & Co., Ltd. 31 Ward, Thos. W., Ltd. 40
Bull, John, Rubber Co., Ltd	Gresham & Graven Ltd 21	Marcroft Wagons, Ltd 40 Marsden, Samuel, & Son,	Scottish Machine Tool Corporation, Ltd.	Werkspoor, N.V
Bullers, Ltd. Butler Machine Tool Co.,	Grover & Co., Ltd — Guest, Keen & Nettlefolds (Midlands), Ltd —	Ltd 40 Marston Excelsior, Ltd 25	Setright Registers, Ltd Sheffield Twist Drill & Steel	Westinghouse Brake &
Ltd	(Midlands), Ltd	Maschinenfabrik Augsburg-	Co., Ltd	Signal Co., Ltd 5 White, R., & Sons (Engin-
		Massey, B. & S., Ltd	Siemens & General Electric Railway Signal Co., Ltd.	eers), Ltd — Wickham, D., & Co., Ltd —
		Matisa Equipment, Ltd — Maus, J.M.J., Ltd —	Siemens & Halske, Akt	Wild, A. G., & Co., Ltd — Williams, Henry, Ltd.
Caterpillar Tractor Co., Ltd	Hackbridge & Hewittic	Metallic Seamless Tube Co.,	Silentbloc, Ltd 4 Simmonds Aerocessories,	Winn & Coales, Ltd — Wolf Electric Tools, Ltd —
CAV. III	Hackbridge & Hewittic Electric Co., Ltd — Hackbridge Cable Co., Ltd. —	Ltd — Metropolitan-Cammell Car-	Simmonds & Stokes	Workington Iron & Steel Co. — Wynn-Williams, Llewelyn,
Chapman, A. W., Ltd. — Chipman Chemical Co., Ltd. —	Hadfields, Ltd — Hale & Hale (Tipton), Ltd. —	riage & Wagon Co., Ltd. 17 Mills, The Exors. of James.	(Niphan), Ltd Skefko Ball Bearing Co.,	Ltd Liewelyn,
Churchill Machine Tool Co.,	Hallam, Sleigh & Cheston,	Ltd 18, 19	Ltd 34	
Clayton-Wright, Howard,	Hardy Spicer, Ltd	Mirrlees, Bickerton & Day, Ltd 22	Smith's Industrial Instru- ments, Ltd.	
Cleveland Bridge & Engin-	Hardy Spicer, Ltd Harper, John, & Co., Ltd Harvey, G. A., & Co.	Mitsubishi Electric Mfg. Co. Mitsubishi Heavy Indust-	Smith, John (Keighley), Ltd. — Smith, Thos., & Sons (Rod-	
cleveland Meters, Ltd 39	(London), Ltd	ries, Reorganised Ltd	ley), Ltd	Zwicky, Ltd



Foundry and Engineering Service for Industry

Our foundries and engineering shops, the largest in South Wales, provide a service, not only to the nation's steel industry, but to a variety of industries throughout Britain and the world.

STEEL CASTINGS BEING REMOVED AFTER SHOT BLASTING OPERATION

Carbon Steel Castings up to 10 tons.
Spheroidal Graphite Iron Castings up to 10 tons.
Non-Ferrous Castings up to 15 cwts.

The 'Centriblast' machine illustrated is capable of shot blasting 15 tons of material at one loading.



GAS MAINS BEING WELDED ON OUR 'FUSARC' MACHINE

Steel construction, Fabrication and General Repair Work. All Types of Fabrication of mild and alloy steels up to 25 tons.

The 'Fusarc' welder has a 50 ft. straight run and a reach of 50 in.; it is also equipped to carry out 'submerged welding'.

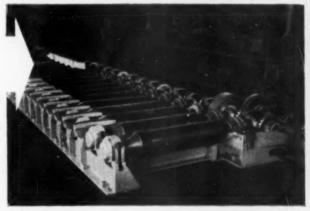


TABLE ROLLERS IN COURSE OF ASSEMBLY

Machine and Erecting Shops. Our machine and erecting shops with 30-ton gantries are equipped to handle light and heavy machine work.

Special-Purpose Machines. We undertake the complete manufacture of machines to customers' design.

The Table Rollers illustrated are for the strip mill being built for the Ebbw Vale works by Davy & United Engineering Co. Ltd.



Richard Thomas & Baldwins Limited

SALES DEPARTMENT, FOUNDRY AND ENGINEERING WORKS, MACHYNYS, LLANELLY, CARMS.

Telephone: LLANELLY 3291 (4 lines)

Further Foundries and Engineering Facilities at our

Head Office: 47 Park Street, London, W.1

Further Foundries and Engineering Facilities at our LANDORE GROUP OF WORKS, Swansea



FOMLER

Touch a button and the Fowler diesel shunter springs to life. Raw materials, supplies and finished products begin to move immediately. And the utter simplicity and rugged design of the trouble-free Fowler keeps them moving, shift-after-shift—if need be for an entire week without refuelling. There's a wide range of Fowler diesel shunting locomotives from 120 B.H.P. to 460 B.H.P. including one, no doubt, fully capable of speeding up your traffic.

MEANS FASTER HANDLING



